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NATURAL HISTORY TRANSACTIONS

OF

NORTHUMBERLAND AND DURHAM;

BEING PAPERS READ AT THE

MEETINGS OF THE NATURAL HISTORY SOCIETY

OF

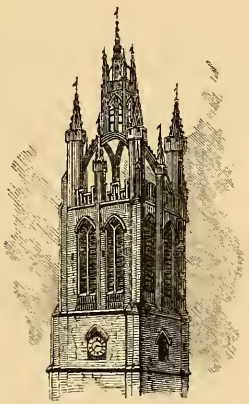
NORTHUMBERLAND, DURHAM, AND NEWCASTLE-UPON-TYNE,

AND THE

TYNESIDE NATURALISTS' FIELD CLUB,

1867.

VOL. II.



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1868.

A NEW FLORA

OF

NORTHUMBERLAND AND DURHAM,

WITH

SKETCHES OF ITS CLIMATE AND PHYSICAL GEOGRAPHY,

WITH A MAP,

BY J. G. BAKER, F.L.S.,

ASSISTANT CURATOR OF THE KEW HERBARIUM, AUTHOR OF "NORTH YORKSHIRE," &c.;

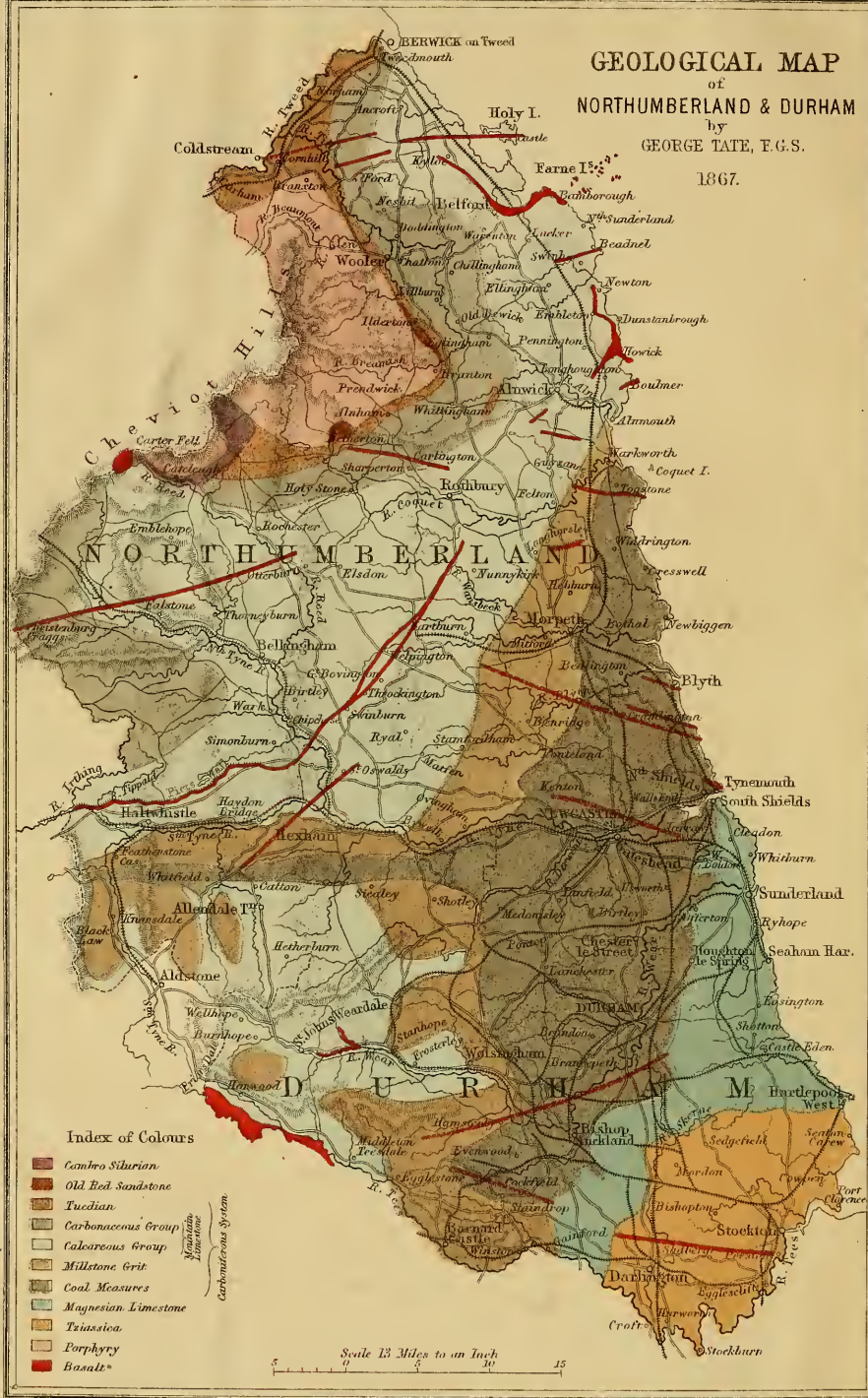
AND

G. R. TATE, M.D.,

ROYAL ARTILLERY;

WITH A SKETCH OF THE GEOLOGY OF THE TWO COUNTIES, AND A MAP,

BY G. TATE, F.G.S.


GEOLOGICAL MAP
of
NORTHUMBERLAND & DURHAM
by
GEORGE TATE, F.G.S.
1867.
BERWICK on Tweed
Tweedmouth
Holy I.
Coldstream
Farne Is.
Bamborough
Belford
Wooler
Alnwick
Rothbury
Morpeth
Bellingham
Blyth
Tynemouth
South Shields
Haltwhistle
Hexham
Allendale Tn.
Aldstone
Wolsingham
Bishop Auckland
Stockton
Darlington
Sunderland
Seaham Har.
Hartlepool West
Cheviot Hills
NORTHUMBERLAND
DURHAM
Index of Colours
Cambro Silurian
Old Red Sandstone
Tuedian
Carbonaceous Group
Calcareous Group
Millstone Grit
Coal Measures
Magnesian Limestone
Tziassica
Porphyry
Basalt
Mountain Limestone
Carboniferous System
Scale 13 Miles to an Inch
5 0 5 10 15

NATURAL HISTORY

TRANSACTIONS

OF

NORTHUMBERLAND AND DURHAM.

A NEW FLORA

OF

NORTHUMBERLAND AND DURHAM.

PART I.

GEOLOGY, CLIMATOLOGY, AND PHYSICAL GEOGRAPHY.

CHAPTER I.

GEOLOGY, BY GEORGE TATE, F.G.S., &c.

As the principal object of this memoir, on the geology of Northumberland and Durham, is to supply data to help the botanist to see how far the Flora of these counties is influenced by their geological structure, I shall especially direct attention to the mineral character and range of the various rock formations. Nevertheless, the consideration of more general questions will not be altogether avoided; the classification of groups of strata, according to age, will be attempted; their organic history will be indicated; and as relative elevation itself gives a character to vegetation, it will be necessary to notice in passing, the disturbing agencies which at different periods have rent the strata and lifted up our mountains, or left an impress on the general contour of the surface.

The two counties have an area of 2905 square miles. The surface of the district rises from the sea coast to the westward, as far as the elevated ranges, forming the backbone of England, and the dividing ridge between the eastern and western coasts; and hence all the rivers and streams flow eastward into the German ocean. The western boundary, on the northern part of Northumberland, is formed by the porphyritic range of the Cheviots, the highest elevation being 2676 feet; and further southward by sandstone hills and ridges from 500 feet to 1809 feet in height. Southward of the Tyne, the whole slopes away from the Penine range, whose culminating point, Cross Fell, 2901 feet above the sea level, is but a short distance beyond the district. The physical aspect is therefore very varied: along the coast are some broad plains; further inland are low rolling hills, and then long broad high ridges, expanding into dreary moorlands; but on the western borders there are, in some parts, fine conical smooth hills, and in others high rugged cliffs. A few wide valleys there are through which larger rivers flow; but the burns and waters wend their way from the hills through contracted vales and narrow picturesque denes. This inequality of surface is of itself favourable to the production of a varied Flora; and these conditions have been made more favourable still by the variety of the rock formations; for not only are there series of strata, differing in mineral character and disintegrating capability, from the old Greywacke up to the New Red Sandstone, but also a number of igneous rocks in mountain ranges, in overlying masses, and in lateral and vertical dikes.

In describing the geology of this district I shall begin with the oldest sedimentary strata, and follow the succession of formations up to recent deposits, and then notice the various igneous rocks. The whole are arranged in the following table:—

AQUEOUS ROCKS.

PALÆOZOIC ERA.

I. Cambro-Silurian System.

II. Upper Old Red Sandstone Formation.

III. Carboniferous System, in four Formations.

1. Tuedian.
2. Mountain Limestone in two groups.
   a. Carbonaceous.
   b. Calcareous.
3. Millstone Grit.
4. Coal Measures.

IV. Permian System.

Magnesian Limestone Formation.

MESOZOIC ERA.

V. Triassic or New Red Sandstone.

CAINOZOIC ERA.

VI. Plistocene.

Boulder Clay, Gravels, Sand.

VII. Post plistocene.

Gravels, Peat.

IGNEOUS ROCKS.

Felspathic.

Porphyry, Syenite.

Augitic.

Basalt, Greenstone.

I. CAMBRO-SILURIAN.

Cambro-Silurian strata occupy but a small area in the western part of Northumberland, and do not occur in Durham. They are highly inclined against the porphyry, in the bed of the Coquet a little above Philip, and extend beyond the source of that river into Scotland. In a deep ravine, eastward of Makendon, they are well exposed; and the Roman camp at Chew Green is formed out of them; for some of the rampiers are natural walls of Greywacke *in situ*, the rock having been removed on both sides.

Southward of the Coquet they extend for some distance along Watling Street. They appear, too, in the bed of the Reed, near to Ramshope, and up the River beyond White Lee, and up the Carter Fell, by the road side, nearly as far as the toll bar. They are a prolongation into Northumberland of the same formation, which runs across Berwickshire, from Siccar Point in a west south-west direction, and which occupies about one-third of Roxburghshire, with rolling hills of moderate elevation. In Northumberland these rocks reach a height of 1700 feet above the sea level, and consist of distinctly stratified Greywacke and Greywacke Slate; but though much jointed, and divided sometimes into flat irregular prisms, they have no slaty cleavage. Crushed and squeezed, highly inclined, and folding over each other, their dip is irregular both as to direction and amount, yet the general strike of the beds is, on the Coquet, from north-west to south-east, and on the Reed from west to east. Composed of felspar and quartz, with a little mica and sometimes chlorite, their disintegration yields a soil retentive of moisture; but as drainage is effected through numerous joints and the highly inclined planes of stratification, the soil above them is comparatively dry. The protusion amongst them of mighty masses of igneous felspathic rocks, in the border counties, seems to me sufficient to account for their elevated and crushed condition.

Their position in the geologic series is thus far certain—they are much older than the Old Red Sandstone conglomerates, which cover them unconformably in Berwickshire and Roxburghshire; and on the Reed they are in like manner overlaid by Mountain Limestone beds. Fossils have not been detected in them in Northumberland, nor in Roxburghshire; but Mr. Stevenson, of Dunse, has found a Graptolite and tracks of an annelid in Greywacke, on the Dye Water, in the northern part of Berwickshire, in beds, however, which appear to be high in the system. The Northumberland strata may be of the same age as the Longmynd rocks, referred by Sedgwick to the Cambrian, and by Murchison to the Lower Silurian system; and hence, until more definite knowledge is obtained, they may conveniently be designated Cambro-Silurian.

II. UPPER OLD RED SANDSTONE.

Red Sandstone conglomerates, of considerable thickness, but occupying an inconsiderable area, appear on the flanks of the Cheviots at Roddam and Biddlestone, in Northumberland, at elevations from 500 to 700 feet above the sea level. In the deep, narrow dene of Roddam, they are exposed for upwards of a mile, consisting principally of conglomerates formed of rounded pebbles of Cheviot porphyry, from the size of a pea to that of the human head, scattered through a flesh and brick-red clay and sand, loosely bound together by peroxide of iron. Interstratified with these are thin beds of harder conglomerate with smaller pebbles, and thin beds of greenish chloritic, calciferous sandstones, some of which contain as much as forty per cent. of carbonate of lime. Above the loose conglomerates are soft thin bedded red sandstones, and below them are hard red sandstones, with large ripple marks. These beds are not less than 500 feet thick. Organic remains I have not found in them; but as their mineral characters and geological position correspond with the Old Red conglomerates of Berwickshire and Roxburghshire, they may, without much doubt, be grouped with this formation. In Biddlestone Burn they are close upon the porphyry of the Cheviots, and they are overlaid conformably by Tuedian strata.

The red conglomerates of the border counties are more connected with the Carboniferous, than with the Devonian system. In some parts of Scotland there is a physical break between them and the Lower Old Red Sandstone. Their relations are best seen in the section from Siccar Point to the northern extremity of Berwickshire, where they distinctly rest on the upturned edges of the Greywacke or Cambro-Silurian strata, and are conformably overlaid by beds of the Tuedian age, the line between the two being marked by the occurrence of *Holoptychius nobilissimus* in the red conglomerate, and of *Stigmaria ficoides* in the Tuedian beds. In this Upper Old Red Sandstone one determinable plant, *Adianthoides Hibernicus*, has been found in Berwickshire; and from similar beds in Roxburghshire I have seen casts of pretty large stems, probably belonging to Sigillaria. A dry fertile soil is produced by the disintegration of these rocks.

III. CARBONIFEROUS SYSTEM.

The Carboniferous system occupies fully three-fourths of the district, and has a thickness of about 7000 feet. It is divisible into four distinct formations, all of which are conformable to each other, and marked by the occurrence of *Stigmaria ficoides*.

1. *Tuedian group* or formation I applied, in 1856, to a series of beds, intermediate between the Mountain Limestone and the Upper Old Red Sandstone, having an aggregate thickness of about 1000 feet, and consisting of grey, greenish, and lilac shales, thin beds of argillaceous and cherty limestones, a few buff magnesian limestones, and of sandstones and slaty sandstones, several of which are red, and some, near the bottom of the series, of considerable thickness. Several, too, of the shales and sandstones are calcareous; so that, though the limestones are thin and impure, there is a considerable quantity of calcareous matter diffused throughout the formation. The limestones are too impure to burn into lime, excepting a curious bed of magnesian limestone, near Carham, which is composed of carbonate of magnesia 44·, carbonate of lime 49·6, silica 4·, and peroxide of iron 1·2, alumina 1·; and in this are nodules of red and grey chert, analogous to flints in chalk. *Stigmaria ficoides*, Lepidodendra, coniferous trees, reed-like stems on which are Spirorbis, a Sphenopteris, and other carboniferous plants, occur both in the sandstones and shales; but there are no beds of coal. The Fauna generally consists of *Rhizodus Hibberti*, Gyracanthus, and other fish; and of mollusks allied to Modiola. Fresh-water or lacustrine conditions are generally indicated; for few distinct marine organisms appear, and where discovered were accompanied by plants in a fragmentary condition, which seem to have been swept into a shallow estuary. One bed of shale, with irregular layers of impure limestone, contains broken trunks of *Pinus primæva* and *antiqua*, showing internal structure, and associated with *Orthoceras multiseptum* (n.s.), *Murchisonia Verneuliana*, *Pleurotomaria*, and a few other marine forms. Brachiopods and Encrinites, which are so abundant in the Mountain Limestone, are almost

entirely absent; I have seen only a few crushed specimens of a Rhynchonella in a shale bed at Garmitage Bank. This formation occupies a considerable area in the Merse of Berwickshire; and it is well developed in the Valley of the Tweed from near the mouth of the Whitadder to Makerston, and hence the name *Tuedian* has been given. It appears in the Vale of Till, and on the flanks of the Cheviots. In Akeld Burn, about 100 feet of characteristic beds are tilted up against the porphyry at an angle of 85°. It is seen also in Biddlestone Burn, in the Coquet below Linn Brig, and on the Ridlees Burn. At Linn Brig, where these beds are in direct junction with the porphyry, they are highly elevated, disturbed, and shattered. A section of them is in Crawley Dene, near to Glanton; and by a great fault they have been thrown up on Garmitage Bank, 5 miles westward of Alnwick. Their relation to other formations is best seen on the Berwickshire coast, where they are intercalated conformably between the Upper Old Sandstone and the Mountain Limestone.

2. *The Mountain Limestone* occupies above two-fifths of the district; but it is principally spread over Northumberland northward of the Tyne. It comes out beneath the Millstone Grit in the valleys and hill sides of the South Tyne, of the East and West Allen, of the Derwent, of the Wear, and of the Tees; but, as these portions are cut off by the Stublick Dike from the northern beds, and are moreover of a somewhat different type from them, it is necessary to notice each series separately.

Northward of the Tyne the Mountain Limestone consists principally of sandstones and shales, with beds of limestone and coal interstratified, and of ironstone nodules and layers among the shales. The general direction of the strata is south-westward, with a rise towards the north-west; but in their range they are interrupted by many faults, which however have the effect of extending the same beds from the Tweed to the Tyne. They are prolonged in a narrow band along the Berwickshire coast as far as Lammerton Sheal. A line from the mouth of the Aln to the Tyne, a little east of Corbridge, nearly marks their eastern boundary. The area occupied by them in the North is narrowed

by the intrusion of the porphyry of the Cheviots; but, southward of that mountain range, they spread out and extend to the western border of the county. Sections may be seen in the affluents of North Tyne, in the Irthing, in the sources of the Reed, in burns flowing into the Aln; but more complete series appear along the coast from Alnmouth to Lammerton Sheal; and these, with the pit sections of Lowick, Scremerston, Sunderland, Eglingham, Shilbottle, &c., give pretty full information of the thickness, the succession, and the organic contents of the several beds. From such data I estimate the total thickness at 2600 feet. The predominant rock is sandstone, of which there are about 1400 feet; of shales there are 900 feet; of limestones 230 feet; and of coal about 70 feet. The *sandstones* are generally free gritstones made up of grains of quartz and felspar, with a little mica; and when in solid beds forming durable building stones. The *shales* are mud beds, in which alumina predominates, forming, when disintegrated, a tough clay sub-soil, several of which are loaded with carbonaceous matter; but there is no hard line between a sandstone and a shale, for slaty sandstones, by a larger admixture of argillaceous matter, become a kind of shale; and even some shales are so carbonaceous as to be combustible. The *limestones* are mostly tolerably pure carbonate of lime; but some beds become magnesian, especially when near to basaltic dikes. The limestones alone, however, do not give us the full measure of carbonate of lime distributed throughout this formation, for many of the shales are highly calcareous, and abound in marine organisms: one such bed at Howick is 15 feet in thickness.

The name, Mountain Limestone, is not physically descriptive of the Northumbrian series, for they contain no thick beds of limestone—none exceeding 30 feet; they form no great cliffs, nor rise to high elevations. In the Lowick district, where most of them crop out, they ascend to a height of only 300 or 400 feet above the sea level; some of the lower beds are seen, on the higher moorlands, at an elevation of 600 feet; and one bed appears, above the Plashets Coal, in North Tynedale, at a height of nearly 1000 feet. But even in these loftier positions they have no influence on the features of the country, which are

determined by the thick dominating sandstones, which crest and form the bulk of all the loftier hills, and, along with the associated shales, give character to the high bleak moorlands ranging through the centre of Northumberland, and spreading towards the south-western borders of the county.

These Mountain Limestone strata may be separated into two groups, both having certain organic forms in common, yet each marked by differences, partly organic, and partly mineral. The upper group, which may be designated *calcareous*, includes all the beds, from the base of the Millstone Grit, down to the base of the *Dun Limestone*, the lowest limestone of any value in the formation: it has an aggregate thickness of about 1700 feet, and is chiefly distinguishable by its good workable limestones, interstratified among alternations of sandstone, shale, and coal, and by the large number of marine organisms connected with the calcareous strata. Of limestones there are upwards of twenty different beds from 1 to 30 feet thick, and having an aggregate thickness of more than 200 feet. A little below each limestone is a coal seam, or traces of coal. Some seams are of fair quality, two, the Shilbottle and the Licker coals, are of superior quality, and one, the Beadnell coal, is in some parts 5 feet thick; yet most of the others are poor and thin. This *calcareous* group is on the same zoological horizon as the Lower or Scar Limestone of Yorkshire, for it yields such organic forms as the following, most of which occur in the Mountain Limestone of Ireland, and many of them in strata of the same age in Fifeshire and elsewhere in Scotland.

Aulopora gigas; Chætetes septosus; Hydnopora cyclostoma; Favosites parasitica; Stenopora tumida; Lithodendron affine, junceum; Lithostrotion striatum, Portlocki; Syringopora ramulosa; Archæocidaris glabrispina, Urii; Cribellites carbonaria; Serpulites carbonarius, Sabella antiqua: Griffithides Farnensis, the only species of a trilobite I have found; Glauconome pluma, pulcherrima; Athyris ambigua, hastata, plano-sulcata; Chonetes Hardrensis, Dalmaniana, polita; Orthis resupinata; Spirifer striatus, trigonalis, glaber; Spiriferina laminosa, octoplicata; Rhynchonella pleurodon; Streptorhynchus crenistria; Productus Cora, fimbriatus, longispinus, spinulosus, Martini; Lingula squamiformis; Aviculopecten concentrico-striatus, tus, coelatus, cancellatus, docens, duplicostata, varii-ornatus, conoides,

interstrialis; Amusium Sowerbyii, decornatum; Pecten subelongatus; Pinna flexicostata, flabelliformis, membranacea; Pteronites angustatus, persulcatus; Posidonia Becheri; Streblopteria pulchella; Myalina Verneulii; Lithodomus dactyloides; Arca cancellata; Bysso-arca costellata; Nucula gibbosa; Leda attennata; Solemya primæva; Leptodomus costellatus; Schizodus axiniformis, carbonarius, deltoides; Conocardium elongatum; Edmondia sulcata, unioniformis, arcuata; Cardiomorpha oblonga, striata; Sanguinolites sulcatus, variabilis, iridoines; Conularia quadrisulcata; Dentalium dentaloideum, priscum; Capulus trilobus; Pleurotomaria atomaria, sulcatula, decipiens, angulata, helicinoides; Euomphalus carbonarius, acutus, catillus, Dionysii; Macrocheilus acutus, Michotianus, limnæformis; Naticopsis plicistria; Loxonema rugifera, sulculosa, elongata; Platyschisma helicoides; Bellerophon Urii, decussatus, striatus, hiulcus, apertus; Nautilus ingens, globatus, perplanatus, sulcatus, subsulcatus, costata-coranatus; Goniatites sphæricus; Actinoceras giganteum; Orthoceras sulcatum, Gesneri, inequiseptum, attennatum, fusiforme, cornu-vaccinum, &c.

The Lower or *Carbonaceous* group, from the base of the *Dun Limestone* to the top of the Tuedian formation, has a thickness of about 900 feet, and is especially marked by the number, thickness, and quality of its coal seams. In this we have in descending order the following eight seams of workable coal, viz., the Fawcet or Falcet Coal, about 40 feet below the Dun Limestone, is from 18 inches to 3 feet 4 inches thick; the Scremerston Main Coal is from 2 feet to 4 feet; the Stoney Coal from 1 foot to 3 feet 6 inches, but of poor quality; the Main or Cancer Coal from 2 feet to 7 feet; the Three-quarter Coal, of inferior quality, from 2 feet to 4 feet; the Cooper or Cowper Eye Coal, one of the best for domestic use, from 17 inches to 3 feet; and the Wester Coal from 3 feet to 4 feet 6 inches in thickness. There are a few limestones in this division, but they are thin and generally impure, and their aggregate thickness is only about 20 feet. Some of the marine organisms of the calcareous group appear here, but in fewer numbers. In some shale beds remains of ganoid fish are abundant, accompanied by *Schizodus carbonarius*, Anthrocomya, Aviculo-pecten, *Lingula squamiformis*, organisms generally associated with coal seams. This group is intermediate in its characters between the calcareous group of the Mountain Limestone and the Coal Measures; and taking the mass, it is more allied to

the latter than to the former. Some thick sandstones near the bottom of the group are red, and might, if colour were a test, be mistaken for Old Red Sandstone.

The Mountain Limestone, southward of the Stublick Dike, differs in some important characters from the northern series: the limestones are very much thicker and greater in the aggregate. Taking the whole series as developed in the district, and in the bordering counties, we find, from Forster's sections, a total thickness of 2080 feet, of which 470 feet are calcareous in nineteen beds, 820 feet are siliceous, and 790 feet are argillaceous. Along the Penine chain, the hills, formed chiefly of such strata, are high, massive, and rounded, with a gradual slope eastward, and a steep inclination to the west, the general dip of the beds being eastward and south-eastward. Here the name is descriptive of the formation; for the thick beds of limestone appear in great cliffs and rise to high elevations, one bed on Mickle Fell reaching a height of 2540 feet above the sea level. The whole, however, is not seen within our district; eleven only of the limestones have been observed, from the uppermost, the Fell Top, to the Tyne bottom Limestone, which, in the neighbourhood of Alston, overlies the Great Whin Sill. We have, therefore, southward of the Stublick Dike, only 900 feet of Mountain Limestone strata, of which 412 feet are argillaceous, 314 feet siliceous, 180 feet calcareous, with only about 4 feet of workable coal. The limestones come to the surface chiefly in the dales, while the siliceous and argillaceous strata occupy the higher grounds; and hence, excepting in these sheltered valleys, or where the limestone spreads over the surface, there is a wide extent of peaty moors covered with heath; and this effect is due also to the predominance of sandstones and shales in the upper part of the series, for of these there are 330 feet between the Fell Top Limestone and the Little or Second Limestone, the intervening strata being similar to those of the overlying Millstone Grit, with which it has been usual to group them.

The limestones are the most regular and characteristic strata. The Fell Top limestone, which is from 2 to 6 feet thick, appears in the dales of the Derwent, the Allen, and the Wear, coming

out from beneath the Millstone Grit; it caps some hills near Allenheads, and forms the summit of Middle Fell in Cumberland: it is fossiliferous, and I have found in it *Productus semireticulatus*, *Spirifer lineatus*, *Strophomena rhomboidalis*, *Orthis Michelini*. The third, the Great Limestone, from 54 to 66 feet in thickness, is the most important of all, being more productive of lead than all the other strata united; it forms the bed of the Aleburn for some distance, and climbs the mountain brow of Ale Fell; it bassets out on the north bank of the Tees and near Frosterley, and dips below the bed of the Wear. Its effect on the soil is conspicuous, and has been well described by Mr. Sopwith. "Its basset," he says, "forms, in many instances, the limit of cultivated land and of human habitations. Below it the hill sides, in spring and autumn, present a beautiful green surface, and in summer an abundant and flowery produce in the meadows; while on the same hill, above the limestone, bare short grass, ling, and moss, impart the brown dreary aspect which characterizes all the higher portion of the mining district, rendered in moist weather or in winter still more dreary by hanging mists on the summits, or wasting snows scattered over the wide expansive sides of the hills, but from the massive character of the scenery, rendered beautiful and even sublime by the blue shades of evening, or the subdued effect of moonlight."* The Scar Limestone, which has a thickness of about 54 feet, appears in Weardale and Teesdale: for some distance it is the roof of the level into the mine at Alston, and it forms a romantic waterfall at Nent Force. The Cockle Shell Limestone, a thin bed of only 2 feet, abounds in fossils, among which is *Productus giganteus*, a form distributed throughout the whole formation. Over the Tyne bottom Limestone, which is 24 feet thick, and the lowest in this district, the river runs from the Tyne head for 4 miles; and this bed, along with the strata above it, extend southward over the banks of the Tees into Westmorland. The limestones below this, among which is that of Melmerby Scar, crop out, beyond our district, in Cumberland and Westmorland.

With our present materials we cannot correlate the Mountain

* Sopwith "On the Mining District," p. 4.

Limestone southward of the Stublick Dike with the northern beds in Northumberland, as the physical characters of the two series are so different, and because, moreover, the organic contents of the southern beds are imperfectly known. In addition to the fossils already noticed I have seen the following, from limestone and shale, at Stanhope: *Terebratula hastata; Rhynchonella pleurodon; Athyris ambigua; Spirifer integricostatus, octoplicatus, glaber; Pleurotomaria altavitta; Bellerophon striatus; Dentalium priscum.* The beds, in this part of our district, have, however, been divided into two groups; those above the Whin Sill, from the Tyne bottom to the Fell Top Limestone, have been referred to the Yoredale series of Philips, and those below the Sill to the Scar Limestone of that author; but this division seems arbitrary, and is not yet supported by organic remains; and it would moreover apply to a limited area only. It would not apply to the northern series; for the Whin Sill, though intruded into the calcareous division of that group, and generally among the higher beds, has no definite place among them—indeed, it cuts through them, and we find its relative vertical position among the strata varying to the extent of 1000 feet.

Throughout the whole of the Mountain Limestone fossil plants, identical with those found in the Newcastle Coal Measures, or analogous to them, occur in the sandstones and shales, and even in the coal itself. The following species are a few of those which have been noticed: *Araucarites carbonarius; Stigmaria ficoides*, very abundantly; *Sigillaria organa, Lepidodendron Harcourtii, obovatum, aculeatum, Sternbergii, selaginoides, gracile, anglicum*, &c.; *Ulodendron ornatissimum; Knorria imbricata; taxina; Calamites Suckowii, cannæformis*, &c. Ferns, so abundant in the Coal Measures, are rare in this group; in a few localities *Sphenopteris Johnstoniana* has been found, a species allied to *S. gracilis.*

Of our modern Flora a few plants in Northumberland are peculiar to the limestone, such as *Sesleria cærulea, Potentilla verna, Spiræa filipendula*, and *Saxifraga tridactylites.* A few others, though not entirely confined to limestone soils, rarely grow elsewhere, such as *Scabiosa columbaria, Viola hirta, Plantago media.*

3. *The Millstone Grit*, which underlies the Mountain Limestone, can scarcely be ranked as a distinct formation, for it differs but little from the Coal Measures, excepting in its feeble development of coal. It is composed of sandstones and shales similar to those in the Coal Measures, and like them, too, it has no limestones or calcareous beds, and but few and doubtful indications of any marine conditions. In this group we include all the beds, from the top of the highest limestone, with marine fossils, to the base of the Brockwell Coal, the lowest workable seam in the Coal Measures. The thickness in Northumberland is about 500 feet; and this corresponds pretty nearly with Forster's section of the formation southward of the Stublick Dike. The characteristic beds are thick gritty sandstones, which sometimes have supplied millstones, and hence the name Millstone Grit. Such beds are made up chiefly of rounded pebbles of quartz and felspar bound together by a siliceous cement: some pebbles in the rock are as large nuts, and some few an inch in diameter. At Warkworth this rock, in some parts, is bound by a calcareous cement, and here and there appear grains of protoxide of iron and garnets. In borings made at Shortridge, two coal seams, each 6 inches thick, were passed through. The proportion of siliceous rocks to the argillaceous in this group is about six to four. Sigillaria, Stigmaria, Favularia, and other Carboniferous plants, occur in the sandstones; and at Berling Carr there are tracks and casts of annelids in slaty sandstones.

These beds in Northumberland range south-south westwards in a narrow zone, from 2 to about 5 miles wide, in the same direction as the Mountain Limestone, on which they rest conformably, from near the mouth of the Aln to the Tyne; but beyond the Tyne they are, through the influence of the Stublick Dike, deflected westward, parallel with that dike, to the borders of the county. Some of the high fell lands of Northumberland south of the Stublick Dike and of the western parts of Durham, are capped by Millstone Grit. North of the Tyne it reaches an altitude of only 460 feet; but in this southern district the Grey Millstone appears on the mountains between Wolsingham and Stanhope. The Grindstone Sill, another characteristic bed, is

the highest stratum of Allenheads; and beds of this group appear on Kilhope Law at an elevation of 2206 feet, and on the top of Cross Fell, which is 2901 feet above the sea-level.

4. *The Coal Measures* which overlie the Millstone Grit, occupy, in Northumberland, the triangular area having the Tyne as a base line 14 miles in length; its eastern side is the coast, from the mouth of the Coquet to Tynemouth, and its western side a wavy line from the Coquet mouth to near Wylam on the Tyne. From this base line they extend into the central portion of the county of Durham; and by a fault called the Stublick Dike they are prolonged, in a narrow band up the valley of the Tyne to the extremity of the county of Northumberland, and into Cumberland, a distance of 27 miles. The whole length of this coal field is about 55 miles, having an area of about 700 square miles, marked by undulating ground of moderate elevation rising gently to the west: the highest hills northward of the Tyne are nearly 400 feet, but some in Durham attain to 740 feet above the sea-level.

In these Coal Measures there is almost a repetition of the same characters we find in the Carbonaceous group of the Mountain Limestone, with this exception, that while there were marine relics and a few thin limestones in the earlier period, limestones are altogether absent from the Coal Measures, and there are scarcely any indications of marine conditions. The sandstones, shales, and ironstones are similar in both; but in the more recent period the coals are thicker, richer, and more bituminous. From the variable thickness of the coal-seams in different parts of the field, and from some seams being split into two by the intervention of shales, of greater or less thickness, it is difficult to correlate the seams in distant parts of the field. There appear, however, to be in all fifty-seven seams, having an aggregate thickness of about 80 feet; but as several are thin, only twelve are workable, yielding about 50 feet of good coal. The Three-quarter Coal, which is of poor quality, crops out in the Ouseburn; the High Main, one of the best for domestic use, is 6½ feet thick, and crops out on the declivity of the hill leading to Denton

Burn; other good coals, such as the Bensham, Beaumont, and Brockley, are worked in collieries west of Newcastle. Several seams are now worked in the neighbourhood of Sunderland, where the overlying Magnesian Limestone has been pierced to reach the Carboniferous beds: one pit there is 1800 feet deep.

Though some of the posts or sandstones are thick, one being 84 feet, yet the proportion of shales is greater in the Coal Measures than in the Mountain Limestone. Assuming the total thickness of these measures to be 2000 feet, then we have 80 feet of coal, 960 feet of sandstone, and 960 feet of shale; and from this large amount of argillaceous matter, the soil of the Coal Measures is more moist and clayey than that over either the Millstone Grit or the Mountain Limestone, and the scenery, too, is of a tamer character, with fewer bold cliffs and high hills. The low portions of the undulating ground are mostly valleys of denudation; for where the thick argillaceous strata have cropped out the soft material has been swept away, and the surface hollowed by denuding agencies, leaving the harder sandstones as low rounded hills.

No undoubted marine organisms appear in these Coal Measures, excepting one Brachiopod (*Lingula mytiloides*), which was found by Mr. Kirkby in a bed of shale, at Ryhope colliery, 680 feet below the Magnesian Limestone; but this genus seems to have had the capacity of living in brackish water, probably in an estuary, for we find it also in the Mountain Limestone associated with coal seams, along with Anthrocosia and fish remains. Of fishes several species have been found in different zones, such as *Gyracanthus formosus* and *tuberculatus*, *Megalichthys Hibberti*, *Diplodus gibbosus*, *Ctenoptychius pectinatus* and *denticulatus*, and species of *Palæoniscus*, *Platysomus*, *Rhizodus*, *Amblypterus*, *Orthacanthus*, *Leptacanthus*, &c. The successful researches of Mr. Kirkby and of Mr. Atthey have extended our knowledge of the Ichthyology of the Coal Measures. From sections of jaws and teeth, prepared by Mr. Craggs, and found in the shales and coal of the Low Main Seam, Professor Owen has recently described eleven new genera of fishes about the size of the minnow, one of which is of the Sauroid type; and associated with them

are remains of what he considers a minute air-breathing Batrachian, with teeth like those of Dendrerpeton and the frog, and which he has named *Gastrodus præpositus*. Associated with fish-remains are usually numbers of Entomostraca (*Beyrichia arcuata*, and *Cytheropsis Scoto-Burdigalensis*), which appear to have acted like scavengers in the carboniferous waters, clearing away the decomposing flesh of the fish. Remains of insects, nearly allied to the genus Blatta, have been detected by Mr. Kirkby in an ironstone band, near the top of the Coal Measures, on the north bank of the Wear, opposite Claxheugh. Plants, however, are the distinguishing organisms of the Coal Measures; they had grown in vast abundance on the ancient swampy ground of the Carboniferous era, and they supplied the material which forms the coal beds. A few coniferous trees flourished at this era, and the following species have been determined: *Picea Withami*, *Pinites ambigua* and *anthracina*, *Dadoxylon approximatus* and *Brandlingi;* but the most abundant plants are *Sigillariæ*, of which thirteen species have been noticed; and they appear to have furnished a large proportion of the vegetable matter forming coal, since their roots, the *Stigmaria ficoides*, are in great numbers in the clay underlying each coal seam. Of *Lepidodendra* there are eleven species, and of *Calamites* seven. Fronds of ferns were in great profusion, and of these fifty species have been recorded, though probably not a few have been determined from different parts of the same plant.

The Carboniferous system has been uplifted and dislocated at different periods. The last upheaval of the Cheviots tilted up the lower strata; and the basaltic protrusions of a later time produced considerable disturbance. But the effects of the greatest elevating force affecting our district are seen in the Penine chain, extending from Tindale Fell southward about 60 miles; for along this line of mighty fracture the Mountain Limestone beds on the east side have been thrust upward, in some parts, near to 3000 feet—and this stupendous mountain wall rises some 2500 feet above the New Red Sandstone plain lying on the west. The Stublick and the Ninety-fathom Dikes are probably secondary effects of this disruption. By the Ninety-fathom Dike, which

extends westward from Cullercoats, the Coal Measures have been thrown down on the north side from 500 feet to 1000 feet. Probably, too, the effect of the Penine upheaval has extended further northward into Northumberland, though without producing any great break in the strata in the direct line of action; for the general direction of the strata is from north to south. There are many other smaller displacements of the Coal Measures, but the Mountain Limestone strata are even more disturbed by faults: one seen in the Shilbottle colliery, ranging from east to west, throws down the beds on the south side 120 feet; another great fault near to Annstead, going westward, throws the strata down on the north side about 1000 feet.

IV. PERMIAN FORMATION.

Of this formation only one member, *the Magnesian Limestone*, appears in our district. It was usual to group with it an irregular, loose, sandy deposit, and some red sandstones lying below it; but the discovery of several true Coal Measure plants, such as *Pinites Brandlingi*, *Trigonocarpon Nöggerathi*, *Calamites approximatus*, and *Sigillaria reniformis*, in these sandstones, at Tynemouth, and of *Neuropteris gigantea*, *Sphenopteris latifolia*, &c., in the shales connected with them, shows that these red sandstones should be grouped with the Coal Measures, the place assigned to them by Dr. William Smith, the father of English geology. Mr. Howse, in 1857, proposed, that they should be considered as the uppermost members of the Carboniferous formation, with which they are seen to be conformable in the section on the coast at Tynemouth.

The Magnesian Limestone occurs in Northumberland in three small patches overlying the Coal Measures; one at Tynemouth forming the top of the cliff, and the others at Cullercoats and Whitley, where it has been preserved by the Ninety-fathom Dike, which has thrown down the strata on the north. It occupies in Durham a large space, somewhat triangular in shape, one side extending from South Shields along the coast to Hartlepool, the other having a wavy line from the same point to

Pierce Bridge, on the Tees: the base line is obscured by drift, but seems to curve away from Hartlepool westward to Chilton, and thence southward to near Coniscliffe. It occupies an area of about 230 square miles, and has a thickness of about 600 feet.

The Magnesian Limestone strata rise to the westward and south-west, and their outcrop over the Coal Measures is seen marked, in the features of the country, by a pretty bold escarpment running in a broken line of eminences of moderate elevation, but nearly on the same level throughout the range. To the west is the wide and tame region of the Coal Measures, but eastward are low undulating hills, intersected by picturesque and beautiful denes and ravines, in some of which rare plants find sheltered habitats, as in Castle Eden Dene, where grows the much-prized *Cypripedium calceolus*. Excepting, however, when covered with detritus, the soil immediately over the Magnesian Limestone is far from being rich or productive.

No formation has been more carefully examined than the Magnesian Limestone of our district. The important researches of Sedgwick have explained its physical characters, and its range and relations; and to Professor Philips, Professor King, Mr. Howse, and Mr. Kirkby, we are indebted for an extensive knowledge of its fossils. The result of these labours has been the determination and description of about one hundred and twenty species of marine organisms. The successive subordinate divisions of this formation have been described by Sedgwick, King, and Howse, to whose memoirs reference may be made for details, and for the views of these authors.* Beginning at the lowest we have the following succession of groups of strata:—

1. *Marl Slate*, a calcareous shale but slightly magnesian, seldom more than 3 feet in thickness, but remarkable for the number of fish-remains with which it is loaded. Thirteen species have been found in it—nine of the genus *Palæoniscus*, the others being species of *Platysomus*, *Acrolepis*, *Pygopterus*, and *Cælacanthus*. With these are *Discina nitida* and *Lingula mytiloides;*

* Sedgwick; Trans. of Geological Society, Vol. III, Part 1, 1829; King's Monograph of Permian Fossils, 1848; Howse on the Permian System, in Annals of Nat. Hist., 1857.

the fern *Neuropteris Huttoniana;* and also *Caulerpa selaginoides*, and other obscure plant-remains, which have been regarded as fucoids. These associated organisms indicate estuarine conditions.

2. Compact limestone, which is earthy or crystalline, brown, grey, mottled or ribboned, and slaty in the bottom beds. The crystalline is chiefly carbonate of lime, but the earthy sometimes contains as much as 44·9 per cent. of carbonate of magnesia. It has a thickness of from 150 feet to 200 feet, but contains few fossils, only eighteen species having been found in it: it appears, however, to have been throughout a pelagic deposit.

3. Fossiliferous limestone, which has a thickness of about 150 feet, is generally light yellow, compact or crystalline, with little appearance of stratification. It is so rich in fossils that about ninety species have been found in it, indicating a pelagic deposit.

4. Concretionary and pseudo-brecciated limestones, are about 150 feet thick, mostly of a light yellow colour, and containing corals and mollusks, indicating generally pelagic conditions; but in some laminated or slaty beds fishes have been found in considerable numbers, of the genera *Palæoniscus* and *Acrolepis*, accompanied with a calamite, and with other plants supposed to be fucoids.

5. Crystalline, compact, and oolitic limestone, which is often laminated, and sometimes ripple-marked. Corals and Brachiopods are absent, but it contains species of *Myalina* and *Schizodus*, which point to shore or shallow water. It is about 100 feet in thickness.

The organisms of the Magnesian Limestone bring it into close relationship with the Carboniferous system, of which it properly ranks as a group or formation. Sedgwick, in 1828, pointed out this alliance, and further researches have confirmed his view: Mr. Kirkby has shown that fifteen species of animals were common to the Mountain Limestone and the Magnesian Limestone

groups. Generally, the Magnesian Limestone was a pelagic deposit, with, however, evidences of shallow water at intervals, and alternations from a deep sea to an estuary.

Some plants affect a Magnesian Limestone soil. Sedgwick says, that so characteristic is *Brachypodium pinnatum* of that soil, that by its help he could trace the yellow limestone with great exactness; but it has not been found within our district. The following are peculiar Magnesian Limestone species: *Linum perenne*, *Hypericum montanum*, *Carduus eriophorus*, *Orchis pyramidalis*, *Ophrys apifera*, *Ophrys muscifera*, *Cypripedium calceolus*.

MESOZOIC ERA.

V. TRIASSIC FORMATION.

Red sandstones overlie the Magnesian Limestone in Durham and pass under the Lias of Cleveland. They are much obscured by a covering of drift, and fossils have not been found in them; hence their extent cannot be traced with exactness, nor is their synchronism determinable with certainty. Still, from their relative position, and their mineral character, they may be referred to the Trias, which forms the substratum of the great central plain of England. The lower beds are generally coarse in the grain, and of a brick red colour, and sometimes marly; and above these are gypseous marls. Sections of them appear on the coast near Seaton Carew, and on the banks of the Tees. Unsuccessful sinkings were made through these beds in search of coal; but though 444 feet were gone through at Dinsdale, and 708 feet opposite Sockburn, the Magnesian Limestone was not reached.

These beds occupy the flat country in the south-eastern part of Durham from Hartlepool to the Tees, with an extension westward of 17 miles. The whole area is about 180 miles.

CAINOZOIC ERA.

No hard stratified rocks more recent than the Trias appear in our district; but over a considerable portion of it, excepting on the higher grounds, there are accumulations of clay, gravel, and sand in layers of irregular thickness and extent. The exact

sequence of these superficial deposits is not easily determinable, but we may recognize two groups of different ages.

1. *The Plistocene*, the oldest of these deposits, includes the boulder clay, which is usually tough, red or blue, and sometimes above 80 feet in thickness, but either unstratified, or with an irregular and imperfect kind of stratification. Through this are irregularly distributed fragments of rock, both small and large, many of them weighing several tons; and some, which are angular or but slightly rounded, are polished and striated. Generally, these blocks have been derived from rocks *in situ* in or near to our district; but a few, such as granite, have travelled a considerable distance. The surface of the rocks on which this clay rests has also been found polished like marble, striated, and grooved, the striæ and grooves having the same general direction, and evidencing the movement of a powerful abrading agent in a southerly direction. These dressed surfaces have been observed on the limestone at Middleton, near Belford, on the basalt of the Farne Islands, on limestones at Swinhoe, Dunstanburgh, Little Mill, Hawkhill, Belsay, and on sandstones at Berling Car, south of Alnmouth, and on the banks of the Irthing. Mr. Howse has also noticed such dressings on the Magnesian Limestone near South Shields. Along with this clay, and apparently belonging to the same era, are gravel and sand beds, and fine laminated clays, which are sometimes interstratified with the greater clay deposit. Near to Durham, boulder clay, containing large polished and striated blocks, overlies stratified sands, which are about 30 feet in thickness. Excepting at Tynemouth, where Mr. Howse found small pieces of *Cyprina Islandica*, a marine shell still living on our coast, I know of no fossils which have been discovered within our district belonging to the boulder clay era.

So far as is at present known, moving ice is the only natural agent which produces such dressed surfaces; and therefore it may be inferred, that during the boulder clay era, the North of England had an arctic climate. Not only do the glaciers on the Alps, in Iceland, and other mountain regions, polish and striate surfaces over which they move, but even the ice-covering of an

extensive area of land with a gentle slope, such as Greenland, produces similar effects by slowly moving down to the sea shore; and it is probable, too, that the great icebergs, some of which are 4 miles in circumference, and 1800 feet high, would, when grounding and moving along the sea bottom, also polish and striate rock surfaces. The love of simplicity has, perhaps, led theorists to attribute too much to one cause. The question presented for solution by the phenomena of the boulder clay is complicated; for, as conditions in the problem, there are not only glaciated surfaces and glaciated boulders mixed pell mell in the lower clay, but there are similar boulders in gravel and sand beds, and also stratified sands and clays, and water-worn gravels; and in addition, the occurrence of marine shells in even the lower clay. A comprehensive theory must, therefore, allow for the play of various agencies—the movement of ice down mountains, and over extended areas of land to the sea shore, the stranding of icebergs, the transport of gravel and sand by marine currents, and even the quiet deposit of mud in stiller waters, during the long period comprehended in the boulder clay formation.

2. *Post Plistocene.*—Since the boulder clay era, there has been little change in the general contour of the district: some valleys have been deepened, some shallow lakes and marshes drained; and along the coast can be found traces of slight oscillations of level. Gravel, very much rolled and rounded with beds of sand, chiefly seen in river valleys, accompanied with terraces on the river banks, belong to a later period than the boulder clay. More recent, still, are accumulations of peat, which is formed at all levels from the sea coast to the summit of our highest hills, under the conditions of moisture and cold. A depression of the land is indicated by peat and overthrown trees (sub-marine forests) seen in some parts of the coast, below the line of the lowest tides: a marked case of this character is near to Howick. Frequently below the peat is a deposit of marl, which, in some instances, is filled with fresh-water shells, all of recent species. But besides these there have been found, either in the peat or in the marl, *Bos primigenius*, *Bos longifrons*,

Megaceros Hibernicus, *Cervus Alces*, *Cervus elephas*, the wild boar, and remains of a horse.

IGNEOUS ROCKS.

There are two groups of igneous rocks in this district, of different age and mineral composition—the felspathic and the augitic; or the porphyries and the basalts; the former being of a much greater age than the latter.

1. *Porphyry.*—The Cheviots, a range of hills protruding through, and rising high above, the stratified rocks in the northern part of Northumberland, and extending into Roxburghshire, are composed of porphyry, which, however, varies in its character. Usually, the rock is a porphyrite, with a red felspathic base, in which are scattered crystals of felspar. In some parts it is a dark coloured dolerite, composed of labradorite and augite; and near to Yetholm it is a pitchstone porphyry. Not unfrequently it passes into a syenite, a crystalline compound of felspar, hornblende, and mica; and in some few cases it becomes a granite, formed of felspar, quartz, mica, and a little hornblende. On the north side of the Cheviot, in the Diamond Burn, there are masses of quartz rock in which appear crystals of quartz, some white or translucent, and a few others brown or amethystine. On the Ridlees Burn, where stratified rocks abut against it, the porphyry is amygdaloidal, with geodes, in which are developed fine quartz crystals, or which are filled with agates and calcedonies. The great mass, however, is felspathic.

The boundary line of this porphyritic range begins on the borders, at Presson, and goes eastward to Brankston, where the battle of Flodden was fought; it then bends southward to Yeavering, and by a series of undulations passes by Akeld, Wooler, Ilderton and Brandon, to Ryle, whence it bends westward to Prendwick, and thence, in a south-west direction, crosses the Coquet, above Linn Brig, to Ridlee Hill; after which it bends to the north-west, and crossing the Coquet again, above Philip, extends into Roxburghshire. Another part of the range is prolonged from Roxburghshire into the north side of the Reed above

White Lee. The whole occupies an area of about 200 square miles in Northumberland, and of 100 in Roxburghshire.

This range is marked by distinctive physical features. The lowest level at which the porphyry appears is 200 feet above the sea, in Akeld Burn; but, rising steeply from the stratified rocks, it soon attains a high elevation, generally of not less than 1000 feet: Humbleton Hill, near Wooler, the scene of a famous border battle, is 977 feet high; Yeavering, of archæological and historical celebrity, is 1182 feet; the Newton Tor is 1762 feet; Dunmore is 1860 feet; Windygyle, near the borders, is 1983 feet; rounded Hedgehope is 2348 feet; and broad-backed Cheviot, the highest, is 2676 feet above the sea level. Many of these high hills are of fine conical forms and roll into each other, being separated by short upland valleys or hopes; in others the division is made by narrow rugged and craggy clefts. Through deep valleys or gorges the burns and rivulets brawl over rocky channels, leaping over crags into highly picturesque linns, such as the Harthope and Linnhope Spouts. Naked though the mountains are, being treeless, nevertheless "sublimity breathes from their forms." Where the declivity is considerable long trains of angular rocks, detached from the mass, extend from near the summit to the base; and these, when weathered, have a purple hue, which blends well with the bright green herbage which here and there appears. Locally, these trains are called glitters or glidders, probably from *gleiden* (Anglo-Saxon), to slide.

Though the rock is hard, yet the felspar is liable to decomposition by the ordinary action of the elements, and the soil resulting is highly productive. The top of the higher hills is covered with peat and yields a coarse grass; but on their slopes, and on hills of less elevation, a fine grass grows well adapted for sheep pasturage. Though in the valleys, and ravines, and sheltered nooks several plants of rarity and interest flourish, yet this range, considering its extent, elevation, and composition, has not a rich Flora. Some plants, peculiar to igneous rocks, will be noticed when treating of the basalt; but others, which are confined to the Cheviots, have their habitat there more from elevation than from the mineral character of the rock; as for example, the

Cornus Suecica, and *Epilobium alpinum*. The basaltic rocks yield a more peculiar and varied Flora.

The Cheviot porphyry is undoubtedly the oldest igneous rock in our district. It was protruded subsequently to the Cambro-Siluria era, for the Greywacke beds are highly inclined against it; but prior to the deposition of the Upper Old Red Sandstones, as the conglomerates are partly composed of rolled Cheviot porphyries. The Cheviots, however, had been further elevated subsequently to the Tuedian period, for beds of that age are highly inclined against the porphyry on the Coquet and in Akeld Burn.

2. On the boundary of Northumberland, near to Carham, there is another outbreak of igneous rock unconnected with the Cheviots, and of a later age, but of a porphyritic character, having a greenish claystone base resembling wacke, with crystals of red felspar. It crosses the Tweed at Carham, and the railway near to Reddon Burn, and then runs along Heddon ridge a distance of about 3 miles. It protrudes through beds of the Tuedian group; and near to it is the peculiar Magnesian Limestone with chert nodules.

AUGITIC ROCKS.

The Basaltic Whin Sill is the most remarkable rock in the North of England on account of its long and tortuous range, and of its relation to, and effect upon, the strata it traverses, and among which it has been intruded. A sill it has been called, because sometimes seen, like a stratum, intercalated among stratified rocks. It is not, however, a true stratum, for its thickness varies very much, from 2 or 3 feet to more than 200 feet, and the parallelism of its upper and under surface is preserved only for a short distance; so that, though its extension in the line of direction is great, yet its extension in the line of dip is inconsiderable.

It is traceable through Northumberland, with breaks here and there, from Kyloe to Glenwhelt; and the same kind of rock extends southward into Durham, Cumberland, and Yorkshire.

Let us trace its range, and, as we go along, note any peculiarities. It first appears in the North at Kyloe Crags, in a fine

mural cliff 400 feet above the sea level, resting on sandstone, and overlaid by a shale, which is metamorphosed; it then extends south-eastwards, and at Middleton is intercalated between a limestone and a sandstone, the latter being above it and metamorphosed at the point of junction. From Belford it goes eastward in a succession of high cliffs to Spindlestone, where it rests on limestone, and then to the mouth of the Warn, whence it bends southward to Bamburgh, where it is 75 feet thick, resting on sandstone and shale. Along the coast, between Budle and Bamburgh, there appear two different overflows or veins, separated by metamorphosed shale, and above the basalt is limestone. From Bamburgh it extends seaward, and forms the mass of the rocky islets of the Farne. It reappears on the south side of Beadnell Bay, having above it what we shall call, for distinction's sake, the Bent Hall limestone, which is here magnesian; and after curving inland, and again running along the coast southward of Newton, it sweeps round by Embleton and Spittalford to Dunstanburgh Castle, where, in two places, metamorphosed shales come out of the mass of basalt; and limestone, when in contact with it, is changed into white crystalline marble. It extends along the coast to Cullernose, where it is 120 feet thick, and where, too, remarkable results of mechanical action are seen in the dislocated sandstone strata. Here it bids adieu to the coast, and trends away south-westward by Howick and Longhoughton; and at Ratcheugh there are evidences of two, if not three, overflows or injections, two being distinctly seen in a section at Dunsheugh, where the limestone above as well as the shale below is metamorphosed. It crosses the Aln near to Denwick Mill, and is next seen southward of Alnwick at Stoney Hills, whence it runs to Snipe House and Shieldykes among the lowest beds of the calcareous division of the Mountain Limestone; but between this and the south bank of the Coquet no traces have been found of this sill. It, however, reappears at Ward's Hill, with the Bent Hall Limestone below it, and goes thence to Hartington, beyond which, for some distance, there are two lines of basalt, one passing the Elf Hills and Bavington, and the other West Whelpington and Throckington; but from

Little Swinburn there is only one range towards Gunnerton. At Whelpington, on the Wansbeck, two beds of Basalt are seen, separated from each other by a bed of metamorphosed shale one foot thick, the basalt being below limestone and resting on sandstone. It crosses the North Tyne below Haughton Strother, and appears on the line of the Roman wall at Limestone Corner, and then, after a curve southward, it joins the line of the wall again eastward of Shield-on-the-Wall, thence running westward, as far as Thirlwall, in a succession of high-pillared craggs, with deep gaps or "nicks" between, and with cliff faces to the north and north-west, and reaching, at Winsheals, an elevation of 1000 feet above the sea level. About a mile to the west of Glenwelt, it crosses the turnpike road, beyond which it is little seen in our district till we reach the upper part of Teesdale. Though the basaltic sills in Durham are similar to those in Northumberland, and are intruded among the Mountain Limestone in a similar manner, yet it is not certain that all belong to the same eruption. Near the borders, between Northumberland and Cumberland, basalt forms the bed of a burn, in Knaresdale, for about 400 yards, and also of Gildergate Burn for about 100 yards; but it appears more in Cumberland, in the streams which carry off the drainage of the western side of Cross Fell and Hartside. At Wear Head a basaltic sill appears broken by the Burtree Ford basaltic dike; but further down the Wear, near Stanhope, there is another basaltic sill, which Sir Walter Trevelyan thinks is different from the Great Sill, and situated among beds higher in the Mountain Limestone series. From Unthank Bridge this little sill forms the bed of the river for some hundred yards, and is traceable westward, as far as Westerhope, thinning out in that direction; it is 20 feet thick in Rookhope Burn, where it is intruded between limestone beds, the lower one being metamorphosed.*

The Great Basaltic Whin Sill attains its maximum thickness in the Tees, where it is above 200 feet thick, giving a picturesque character to the wild scenery of Upper Teesdale. It is seen above the Weal, an extensive pool formed by a natural dam

* Trans. Nat. Hist. Soc. of Northumberland, &c. Vol. I, p. 58.

in the river, and is there overlaid by a granular white limestone. At High Force and Cauldron Snout the river cuts through it, and tumbles over cliffs, exposing a limestone below, which is metamorphosed, white and crystalline. This basalt extends nearly as far as Middleton, but in the lower part, at a little distance from the river.

Throughout its long range the rock is essentially the same, being composed of felspar and augite; the iron entering into its composition is in the state of a protoxide, and indeed occasionally, as at the Farne, it possesses polarity. At Budle it is amygdaloidal; and at Ratcheugh some portions are porphyritic, having large felspar crystals scattered through it. Where in great mass the rock has a pillared structure, the columns being rude prisms, irregularly jointed; and some even approach the hexagonal forms seen in Fingal's Cave. They are grand and impressive objects, massive, though rude; and, towering majestically to a great height, we could imagine they had been piled up by the fabulous giants of the olden time.

The metamorphic action of the basalt on the strata *above*, as well as on those below it, is favourable to the view, that the Basaltic Sill is a lateral dyke intruded among the strata after their deposition; and the displacements of strata effected by the eruption lead to the same conclusion. At the Farne Islands, 90 feet of limestones, shales, and sandstones have been torn from the mass with which they were originally connected, and are lifted up and altered in structure. At Howick, too, there are evidences of violent mechanical action; and near to Little Mill there is a marked instance of the same character—for on the western or basset side of the basalt, limestone and shales are highly inclined against it: their dip is to the south-west from 60° to 45°, and the upper shale-beds are bent and thrown over; blocks of limestone, too, are enveloped in the basalt, and metamorphosed and penetrated with veins of the igneous rock, the whole being firmly welded, as it were, into one mass. Though in Northumberland this sill never appears anywhere, excepting in the calcareous division of the Mountain Limestone, and generally among its upper beds, yet its position varies considerably

in different parts of its course; indeed it cuts across these strata in some places, and alters its relative vertical position to the extent of 1000 feet.

There appears, however, to have been more than one eruption, though probably succeeding each other at no great intervals of time: Stanhope, Kirkwhelpington, Ratcheugh, and other places give evidences of this. At Ratcheugh there may have been three eruptions, but two pseudo-strata are distinctly seen there; one of them is wedge-shaped, and, in the course of 500 yards, dwindles down from 90 feet to 30 inches in thickness, while the second mass overlaps the other and is separated from it by 22 feet of intervening limestone and shale. In a pit-sinking at Long Dike, in search of the Shilbottle coal, two layers of basalt were passed through; one, 15 feet thick, is between metamorphosed arenaceous beds; and the other, 63 feet lower down, and 2½ feet thick, penetrates, metamorphoses, and partly replaces a seam of coal.

2. Another mass of trap rock, a greenstone or diorite of considerable thickness, caps the Carter Fell at the height of 1600 feet above the sea level overlying Mountain Limestone strata, which rest on the upturned edges of Cambro-Silurian rocks.

BASALTIC VERTICAL DIKES.

Besides the great lateral dike or dikes, a considerable number of basaltic dikes cut through the Carboniferous strata nearly perpendicularly, most of them having a direction from eastward to westward. The character of the rock of nearly all of them is similar to that of the Whin Sill, but generally finer in the grain, and with the structure more altered by contact with stratified rocks; for at such points there is a mutual transference of character, the basalt itself imbibing, as it were, a portion of the mineral ingredients of the adjoining stratified rock. Of the following *basaltic* dikes we have some definite information. Our list begins with the most northern.

The Cornhill Dike is seen in a cliff on the south bank of the Tweed, half a mile below Coldstream Bridge, cutting perpendicularly through the Tuedian beds with a direction of north 82°

east, and is traceable a distance of 7 miles, passing, in its course, also through Mountain Limestone strata. On the Tweed it is 10 feet wide, but it thickens eastwards, and at Melkington it is 15 feet, and at Mattalees 33 feet wide.

The Lindisfarne Dike has a course from eastward to westward, but not straight. It crosses the south part of Holy Island in the direction of south 85° east, and is seen two miles seaward, forming the Plough and Goldstone rocks, on which the *Pegasus* was wrecked. On the west side of the island the dike is exposed in a high cliff, and is there 120 feet wide, with a slope to the south of 95°; large blocks of limestone are enveloped in the basalt and highly metamorphosed, and the strata have a considerable upcast on the south side. A calcareous shale, highly fossiliferous, lying above a limestone, is remarkably metamorphosed—and near to the Castle veins of the basalt penetrate the shale. This dike is seen near Fenham, and afterwards a little northward of Kyloe church, where it has a direction of S. 80° W., and is from 20 to 60 feet wide, increasing in width as it descends; and in one part it is covered by sandstones and shales. It cuts through the Lowick coal field and is traceable westward to Leitham, the whole ascertained course being about 14 miles.

The Beadnell Dike is well exposed on the coast, rising like a Cyclopean wall through sandstone, limestone, shale, and coal beds, whose relative position is but slightly altered, but whose structural characters are greatly changed: coal for some distance from it is valueless, limestone near it will not burn into lime, and shale and sandstone are indurated. The mutual transference of qualities, between the basalt and the stratified rocks penetrated, is well illustrated in this dike. Its width is generally 25 feet; the direction is south 85° west; and it is traceable four miles inland as far as the Newham Station.

The Howick Dike is only 4 feet wide, sloping south 95°, and with a direction of north 80° east. It is seen only on the coast, and is remarkable for its wall-like appearance and its nearness to the Whin Sill, which, however, it is not seen to join.

The Boulmer Dike is 100 feet wide, ranging north 80° east, and appears only on the coast passing perpendicularly through Mountain Limestone strata, which it has altered but slightly.

Trobes Dike is seen in the eastern part of the Shilbottle colliery, running in the direction of south 85° west, having a width of 33 feet, and metamorphosing the strata on both sides.

The Hampeth Dike is large, and passes through the Shilbottle coal field. A mile and a half south-west of Shilbottle it appears in the bed and banks of Hampeth Burn, which has forced a pass through this rocky barrier by a narrow gorge, the basaltic cliffs on both sides reaching the height of 50 feet. The width of the dike here is 150 feet, and the direction S. 80° W.: near to it the coal is charred. It seems to extend to the sea, passing through Millstone Grit beds a little southward of Berling Carr.

The Acklington Dike has a general direction of west by north, and appears on the coast at Bondicar; passing through the Coal Measures and Millstone Grit, it crosses the Coquet near to Acklington Park, where it is 30 feet wide. A dike in the line of this is seen cutting through the Mountain Limestone, at Debden colliery, and ranging onward as far as Clennell approaching near to the porphyry of the Cheviot, *but never entering it.* At Cartington Castle a limestone abuts against it on the north side. The range is thus about 20 miles.

The Causey Park Dike is 30 feet wide, and has a direction from east to west, cutting through Millstone Grit strata. Gritty sandstone abuts against the north cheek, and flaggy sandstone and carbonaceous shale are on the south side.

Two dikes, about a mile and a half apart, run parallel from *Hartley* to a mile northward of Cramlington, in the direction of west north-west, and pass through Coal Measure strata. In a line with the Southern Hartley Dike is one at *Bolam* cutting through Mountain Limestone beds, which are metamorphosed.

The Tynemouth Dike appears in the cliff below the Priory, rising through the Coal Measures, the red sandstone, and the

yellow sand; but it is not seen either underlying or penetrating the Magnesian Limestone, which caps the same cliff a little to the northward of the dike. It is 12 feet wide, and runs in the direction of south 40° east to north 40° west, with a slope southward of 85°. The dikes we have noticed are basalt, but this is more allied to greenstone or diorite.

The Coaly Hill Dike varies in width from 7 feet to 21 feet, and has a general direction of E.S.E. It seems to be the same as that which comes to the surface at Ouseburn, and at Simonside, in the county of Durham. Buddle has described it, and notices, that it pursues an undulating course, only occasionally appearing on the surface. In Benwell colliery it is 200 feet, and in Walker colliery 630 feet below the Tyne level. The coal in contact with it is reduced to "cinder."

Two small dikes with an east to west direction, about 13 feet apart, one being 5 feet and the other 6 feet wide, dipping north 78°, are in *Walbottle Dene:* these have the character of greenstone.

The Brunton Dike, on North Tyne, which cuts through the Mountain Limestone beds from north 40° east to south 40° west, is 16 feet wide, and throws down the strata on the west side above 20 feet. It crosses the South Tyne passing Warmley, and probably extends to Whitfield, where a basaltic dike is seen on the West Allen.

The Lewis Burn Dike has a long and somewhat irregular course, but with a general direction of east north-east; and it is traceable from Short Cleugh, on Lewis Burn, to Troughead and Darden, in Redesdale, a distance of 12 miles. At Short Cleugh, in the deep gullies made by water torrents, this dike is exposed at several points; it widens as it descends, and attains the width of 50 feet; a small branch comes from the main trunk, and is seen in the hill side. The Mountain Limestone strata, which it cuts through, are greatly dislocated; on its south side sandstone beds are flat, while on the other they are nearly perpendicular.

Of the two principal basaltic dikes in Durham we have some definite information.

The Hett Dike has a direction of E.N.E., and passes through the Coal Measures, Millstone Grit, and Mountain Limestone. It may possibly have its origin from the Whin Sill. It is seen in Eggleston Common, and where it crosses Eggleston Burn it is nearly vertical, and 33 feet wide. It is traceable eastward to Hett and Quarrington, passing through the Crow Trees colliery and dividing and charring the Five-quarter and High Main Coal Seams; but it does not penetrate the overlying Magnesian Limestone. As it extends eastward and approaches the surface it diminishes in width, and at Crow Trees it is only 6½ feet.

The Cockfield Dike, from its great length, is one of the most important, extending from north-west to south-east about 70 miles, and passing through Mountain Limestone, Millstone Grit, Coal Measures, and New Red Sandstone. It varies in width from 17 feet to 60 feet. At Cockfield the coal in contact with it is charred, and the strata are upcast 18 feet on the south.

No basaltic dike has yet been seen among the Magnesian Limestone strata.

We know not the vomitaries of these augitic igneous rocks. Along the whole range of the Whin Sill no crateriform hollows or cones appear: the molten matter, therefore, had probably been ejected through long lines opened by deeply-seated forces acting in the general direction of north to south. The vertical dikes of basalt have a direction transverse to that of the Whin Sill; and though, as Philips remarks, "geographically related to it," are never seen in junction with it. They are too small to have been the vomitaries of the Whin Sill; and supposing they are of the same age, they do not help us much to determine the period of eruption. None of them, excepting the Cleveland Dike, which is at the southern extremity of our district, pass through beds more recent than the Coal Measures. The Whin Sill, however, as Philips has shown, is anterior to the east and west veins of Tynedale, for it is divided by these veins of fissure, and, as these fissures have resulted from the Penine fault, the Whin Sill is older than the Triassic beds. Subsequently, then, to the Carboniferous, and prior to the Triassic era, this district was convulsed

and rent by volcanic forces, most probably when beneath the sea; and, at remitting intervals, molten lava was poured out of fissures generally in a line from north north-east to south south-west, partly over the sea-bed, and partly thrust in among the stratified rocks which it metamorphosed; and, cooling slowly, under the influence of considerable pressure, this lava assumed the stony crystalline character of basalt. Mr. Hopkins has shown how minor fissures are formed transverse to the chief line of fracture, and therefore it is highly probable that the transverse basaltic dikes are due to the same causes which produced the Whin Sill.

Some plants in Northumberland are confined to the igneous rocks, and chiefly to the augitic group. *Dianthus deltoides* is common to the porphyry and basalt: I have seen it on the very verge of the porphyry, but I could not, after diligent search, find a single specimen straying across the border to a stratified rock. *Pyrola secunda*, and *Teesdalia nudicaulis*, have not been noticed except on porphyry. But the following occur in Northumberland only on the basalt: *Mœnchia erecta*, *Sagina subulata*, *Vicia lathyroides*, *Asperugo procumbens*, *Statice limonium*, *Convallaria polygonatum*, *Allium schœnoprasum*, *Scilla verna*, *Sedum anglicum*, *Asplenium septentrionale*, *Asplenium germanicum*. *Helianthemum vulgare*, although also occurring in limestone, I have sometimes found a useful guide in tracing the range of the Whin Sill.

POSTSCRIPT TO CHAPTER I.

ADDITIONAL OBSERVATIONS ON THE INFLUENCE OF THE SUBJACENT ROCKS ON PLANT DISTRIBUTION, BY J. G. BAKER.

From the more strictly botanical point of view I propose to supplement Mr. Tate's sketch by a few observations on the influence exercised by the character of the subjacent rocks on the distribution of the Flora. The sedimentary beds of the north-east of England fall under two well-contrasted types in their influence on the scenery and botany. These,* following the nomenclature

* Thurmann. Essai de phytostatique applique a la chaine du Jura. Berne, 1849.

of the writer who has investigated the subject most carefully, we will name dysgeogenous and eugeogenous, names derived from the comparative readiness with which they produce detritus, and yield to disintegrating influences. In the North of England the first is typically represented by the limestones of various ages, and the other by the sandstones and shales from the Kimmeridge clay down to the Old Red. We see the two opposite types of scenery contrasted better in Yorkshire than in Northumberland and Durham. In the North Riding the eastern third is occupied by two parallel ranges of hills, running from west to east, for a length of 30 miles, from the central vale to the coast, one formed from the arenaceous rocks of the lower oolite formation, and the other from the calcareous upper oolite, which show the characteristic features of the two types excellently. The flat table lands of the limestone hills contrast with the irregular undulations of the sandstone hills: the steep precipitous calcareous scars, not less so with the irregular "edges" of freestone and gritstone. The sandstone hills are intersected by branching rivulets, which flow from their upper levels gradually down their slopes into the low country. The limestone hills have neither streams nor natural pools upon their surfaces, but the glens slope suddenly, and the water sinks through the calcareous beds to gush out in large volume when it reaches some less permeable stratum. The sandstone dales are open and irregular, with gradual slopes and undulated embankments; the limestone dales are steep and narrow, with sudden slopes and embankments rising up like a wall upon each side to shut them in. In Northumberland and Durham we have only a limited and not very characteristic development of limestone hill and dale. The great series of beds deposited during the Mountain Limestone period, so characteristically calcareous in Derbyshire and the West Riding of Yorkshire, gradually loses this character as it passes northward, and as Mr. Tate has already explained, has changed completely by the time that it reaches Northumberland. Unless this state of things is kept in view, any one looking at our geological map may easily get a very wrong idea into their mind about the physical geography of our field of study. We have an instance of a

similar difference in lithological character between two contemporaneous deposits in the lower oolite, which is thoroughly calcareous in the South of England, but in Yorkshire has only a single bed of impure limestone 30 to 60 feet in thickness in the midst of an arenaceous series 800 feet in depth. In our two counties we get this limestone type fairly shown only in the comparatively small Magnesian Limestone tract of the east of Durham, and its features developed, to a certain extent, in the upper part of the western Durham dales, especially in Teesdale and Weardale. The wide extent of hill-country between the Cheviots and the Tyne, several hundreds of square miles in area, and the fells and the slopes of the west of Durham, with the exception just indicated, show everywhere in their contours and Flora the distinctive features of the eugeogenous type. We will, therefore, in the first place, attempt a detailed sketch of the vegetation of a hill of this kind. Our notes refer to Simonside, which was selected as being a fair typical representative of the shale-sandstone type of moor which occupies so large a proportion of the northern English counties.

General Sketch of a Eugeogenous Hill and its Vegetation.—From Rothbury to the summit cairn, at the east end of the hill, the distance is about 4 miles. Walking up the dale on the south side we have to keep the high road as far as the little village of Tosson, and then are in a straight line between the peak and the Coquet. At 500 feet above sea-level, and 200 above the river, we pass the highest farm house, and very soon the corn fields cease, and we climb through a meadow along the bank of the streamlet which flows down from the hill to the Coquet, a tiny brook overshadowed by ash-trees and bushes of bird-cherry, hazel, and blackthorn, with *Crepis paludosa* growing amongst them, and a beautiful form of *Rosa tomentosa*, with pure white petals just tinged towards the edge with red. Then a half-drained rushy pasture (one of the rushes in which is *Juncus diffusus*) is crossed, and we enter upon the open moor. From where the heather begins, to the highest point of the hill, the ascent is 900 feet, and the distance is not less than a mile, but

it looks much less, for as usually happens in climbing hills, the highest part cannot be seen from the bottom, and we reach several successive ridges, each with a craggy edge of gritstone, only to find that there is another terrace to cross and another ridge to climb before the real highest is gained. All down this sloping bank the fallen rocks are scattered, rounded masses of fine-grained gritstone, so soft in texture, that it crumbles away easily into a silvery-grey powder, which is often scattered over the bare turf, the micaceous particles glittering in the sunshine; and from the summit crag all down the bank the heather sweeps (brown for ten months of the year, bright purple for two), thick-swelling over the terraces and in the hollows, stunted and scraggy amongst the rocks and where the soil is thin. The three kinds of heath are all here in plenty, and in July the *Ericæ* are already in flower whilst the *Calluna* still remains in bud, and there are *Vaccinium myrtillus* and *Empetrum nigrum* scattered amongst them, and *Eriophorum vaginatum* and feathery tufts of *Nardus* waving in the mountain breezes, and scattered clusters of *Aira flexuosa*, conspicuous by its bright red stems and silvery brown panicles. At the bottom the furze bushes and the foxgloves grow tall and fine, but they stop before we reach the higher levels; and the slopes and hollows are filled with bright-green forests of *Pteris*, which grow up to form intertangled thickets in the late autumn, and sometimes with *Blechnum*, and the lady-fern, and *Lastrea oreopteris* scattered amongst it. The damper spots are spongy with mosses, *Hypnum fluitans*, *Polytrichum commune*, and *Sphagnum*, ranging in colour from deep red to bright green, with pale green cushions of *Leucobryum* and *Aulacomnion palustre*, and amongst them *Drosera rotundifolia*, *Carex ampullacea*, *Eriophorum angustifolium*, and the clustered sword-like leaves of *Narthecium*. The streamlets which issue from the hill-side ripple noisily down their shallow, stony channels, or contract and sink down, and are hidden for awhile beneath overhanging grass and rushes. The principal mosses of the well-heads are *Hypnum condensatum*, *H. cuspidatum*, *Bartramia fontana*, and *Bryum pseudo-triquetrum*, the first brownish, the others pale green, or the last often brightly tinged with red. Amongst them *Chrysosplenium*

oppositifolium, *Montia fontana*, and *Stellaria uliginosa* grow intermixed, and in the swamp by the stream side are *Carex dioica*, *stellulata*, *pulicaris*, *flava*, and *glauca*, *Molinia cærulea*, and yellowish-green soft glossy tufts of *Pinguicula*. The drier and more grassy parts of the hill-side yield *Galium saxatile*, *Triodia*, *Anthoxanthum*, *Carex binervis*, *Potentilla tormentilla*, and abundance of *Festuca ovina*. The highest ridge is formed of large rounded crags of a coarser-grained rock than the scattered masses below, often variegated with lichens, obscure-crusted black-pointed *Lecideæ*, interspersed sometimes with the brighter hues of *Lecidea geographica*, wide-spreading silvery-grey patches of *Cetraria glauca* and *Parmelia saxatilis*, and darker ones of the *omphalodes* variety of the latter, coral-like cushions of *Sphærophoron*, and the ink-coloured leathery *thallus* of *Umbilicaria proboscidea*. The crags are too dry to produce many mosses, the principal kinds which occur being *Hypnum cupressiforme* and *Dicranum scoparium* upon their exposed faces, and in the shady crevices *Jungermannia albicans* and *Mnium hornum*. In the sheltered hollows *Lastrea dilatata* may sometimes be seen and *Luzula sylvatica* amongst the scattered ling bushes, and casually *Listera cordata* and *Vaccinium vitis-idæa* under the shade of the heather.

This, then, is the kind of vegetation which, with extremely little variety, covers a large proportion of the uncultivated and especially the upland parts of our two counties. The most distinctly marked influence upon the topography of the species produced by the distribution of the subjacent rocks, is the more or less absolute restriction of a certain number to the limestone tracts. Out of our eight hundred and forty-four native species there are forty-four which show clearly this lithological restriction. In North Yorkshire, as might be expected from the greater predominance of the calcareous element in the strata, the number of these *Xerophilous*, or dry-loving species, as Thurmann calls them, is considerably greater. There are three tracts of limestone in the North Riding, the Carboniferous, Permian, and Oolitic, which are surrounded by, and separated from, one another by wide tracts underlaid by arenaceous and argillaceous beds, so that it is a district exceedingly well-adapted for showing

clearly which the restricted species are. The following are the Northumberland and Durham species, those marked with a star being confined to the Magnesian Limestone.

Plants peculiar to the Limestone.

Aquilegia vulgaris.
Draba incana.
Arabis hirsuta.
Helianthemum vulgare.
Viola hirta.
Cerastium arvense.
Arenaria verna.
*Linum perenne.
*Hypericum montanum.
Geranium sanguineum.
Anthyllis vulneraria.
Astragalus glycyphyllus.
hypoglottis.
*Onobrychis sativa.
Spiræa filipendula.
Rubus saxatilis.
Poterium sanguisorba.
Pyrus aria.
Galium sylvestre.
Scabiosa columbaria.
*Carduus eriophorus.
Carlina vulgaris.
Campanula glomerata.
*Ligustrum vulgare.
Polemonium cæruleum.
Gentiana verna.
amarella.
Atropa belladonna.
Salvia verbenaca.
Origanum vulgare.
Calamintha nepeta.
Taxus baccata.
*Orchis ustulata.
pyramidalis.
*Ophrys apifera.
* muscifera.
Cypripedium calceolus.
Convallaria majalis.
Sesleria cærulea.
Avena pratensis.
Melica nutans.
*Bromus erectus.
Hordeum sylvaticum.
Polypodium calcareum.

The following are the plants of this class which occur in North Yorkshire, but not with us at any rate in a truly wild state:—

Anemone pulsatilla.
Actæa spicata.
Helleborus viridis.
Hutchinsia petræa.
Helianthemum canum.
Hippocrepis comosa.
Potentilla verna.
Dryas octopetala.
Galium erectum.
Dipsacus pilosus.
Asperula cynanchica.
Inula conyza.
Orobanche rubra.
Calamintha officinalis.
Epipactis ovalis.
Spiranthes autumnalis.
Carex digitata.
Brachypodium pinnatum.
Ceterach officinarum.

Rising to the upper levels, it is usually with the limestone that the common plants of dry grassy situations reach their highest points. In the list of species it will be seen how often the most elevated points at which these have been noted are in connection with the Main Limestone of Allendale, Harwood-dale, and the Weardale "Hopes;" whilst the arenaceous peaks and ridges present everywhere what a botanist on the outlook for rarities is apt to consider a monotonous repetition of heather, and the other common gregarious swamp-heather-land plants which have been already noticed in the account of Simonside.

The following is a list of all the species seen within the bounds of the upper zone on Kilhope Law, and it might stand, with very trifling variation, for any other of the higher peaks and ridges of this character.

Florula of the Upper Zone on a Eugeogenous Hill.

Viola palustris.
Potentilla tormentilla.
Galium saxatile.
Rubus chamæmorus.
Calluna vulgaris.
Erica tetralix.
Vaccinium myrtillus.
vitis-idæa.
Empetrum nigrum.
Luzula multiflora.
Juncus supinus.
effusus.
Juncus squarrosus.
Carex stellulata.
Eriophorum vaginatum.
angustifolium.
Aira flexuosa.
Nardus stricta.
Anthoxanthum odoratum.
Agrostis vulgaris.
Poa annua.
Festuca ovina.
Blechnum boreale.
Lycopodium selago.

M. Thurmann has given for a portion of Central Europe a full list of the indigenous plants, and an account of their distribution with regard to the subjacent rocks. In Central Europe there are two extensive ranges of hill, of well-marked contrasting lithological character, the dysgeogenous Jura, and eugeogenous Vosges. Comparing the British flora as a whole with that of this region, and, indeed, with that of any other part of Central Europe, we see, even by glancing over the mere list of names, how conspicuously with us the damp-loving element predominates. He gives for the rocks of each class a list of the fifty

plants which he finds to be most characteristic; and of those which he names for the dysgeogenous strata, we have in Northumberland and Durham eight species only, whilst out of the eugeogenous fifty which are frequent in the arenaceous Vosges, but either nearly or quite absent in the calcareous Jura under parallel, or nearly parallel, conditions of atmospheric climate, we have thirty-five species, which are the following:—

List of Northumberland and Durham Plants which are characteristically Eugeogenous in Central Europe.

Orobus tuberosus.
Prunus padus.
Betula alba.
Spartium scoparium.
Quercus sessiliflora.
Alnus glutinosa.
Calluna vulgaris.
Aira flexuosa.
Hieracium boreale.
Ononis spinosa.
Jasione montana.
Hypericum pulchrum.
Stellaria holostea.
Galeopsis ochroleuca.
Trifolium fragiferum.
Luzula multiflora.
Filago minima.
Aira cæspitosa.
Alopecurus pratensis.
Triodia decumbens.
Rumex acetosella.
Montia fontana.
Nardus stricta.
Hypericum humifusum.
Senecio sylvaticus.
aquaticus.
Arenaria rubra.
Lotus major.
Vaccinium myrtillus.
Juncus squarrosus.
Meum athamanticum.
Digitalis purpurea.
Galium saxatile.
Saxifraga stellaris.
Asplenium septentrionale.

We have in this list most, or very nearly all, the very species which make up the gregarious swamp-heather-land vegetation of which we have spoken as covering, with us, such wide tracts of surface. Of the four kinds of rock—limestone, porphyry, slate, and sandstone mixed with shale, that in the North of England form hill-masses on a grand scale, there are none from which these plants as a class are excluded, though it is amongst the sandstones that the ericetal species especially attain their greatest luxuriance and frequency. To sum up the bearings of the subjacent rocks on plant-topography, as exercised with us, as compared with what takes place in Central Europe, we shall be safe

in saying, 1.—The species which in Central Europe are restricted to dysgeogenous tracts occur with us in small number only, and are restricted lithologically in a similar manner. 2.—The species which in Central Europe are restricted to eugeogenous tracts occur with us in large number; and under our more boreal and humid climate grow abundantly, and cover wide areas of surface without keeping up any clearly-marked role of lithological restriction. And this shows us in what direction the interference of the rocks operates. A more porous and more humid soil evidently, to some extent, compensates for a drier climate; and in proportion as the climate is damper the characteristically dry-loving species are more restricted to dry-soiled tracts of country. This is the rule, and in botanico-geographical considerations it is evidently worth bearing in mind; but to what extent it has been influential in determining which species we should have or which we should not have, either in our two counties or in Britain as a whole, or to what extent it has, for instance, operated in the restriction to the area which they occupy, of the plants of what Mr. Watson calls the Germanic type of distribution, we can but guess vaguely.

About the basalt and porphyry we have said nothing as yet. The following is a type florula for one of our lower zone porphyritic crags, the cliff selected being one by the side of the Coquet, between Windyhaugh and Shillmoor, at an elevation above sea-level of from 630 to 700 feet.

Florula of a Lower Zone Porphyritic Crag.

Draba verna.
*Arabis hirsuta.
Sisymbrium thalianum.
*Helianthemum vulgare.
Dianthus deltoides.
Cerastium triviale.
Sagina procumbens.
Viola sylvatica.
Geranium Robertianum.
Hypericum pulchrum.
Spartium scoparium.
Rosa spinosissima.
Pimpinella saxifraga.
Hedera helix.
Galium cruciatum.
verum.
* sylvestre.
Hieracium pilosella.
vulgatum.
Leontodon taraxacum.
Apargia autumnalis.
Carduus lanceolatus.

Carduus arvensis.
Centaurea nigra.
Achillea millefolium.
Campanula rotundifolia.
Veronica arvensis.
Digitalis purpurea.
Teucrium scorodonia.
Myosotis arvensis.
Plantago lanceolata.
Rumex acetosella.
Urtica dioica.
Festuca ovina.
*Avena pratensis.
flavescens.
Aira præcox.
Anthoxanthum odoratum.
Poa nemoralis.
Agrostis vulgaris.
Polypodium vulgare.
Pteris aquilina.

The Xerophilous species adapt themselves to the basalt and porphyry to some extent, more so than to any other kind of rock except limestone, a circumstance which would lead one to suppose that it is the mechanical, rather than the chemical constitution of the rock, that is influential in attracting them. Besides the four species marked with a star in the preceding list, five others, *Anthyllis vulneraria*, *Astragalus glycyphyllus*, *Rubus saxatilis*, *Origanum vulgare*, and *Polemonium cæruleum*, have a fair claim to be regarded as Cheviot plants; and the same is true, even to a still greater extent, with the basalt. The Cheviot heights are much less heathery and more grassy than the sandstone moors, but they are almost as monotonous from the botanical point of view, and totally destitute, still speaking botanically, of any characteristic features. Take Cheviot itself for an example. Although the hill rises very nearly to 900 yards, and there is a wide extent of surface above 650 yards, we believe the following to be very nearly a complete list of the plants which exceed the latter altitude.

Florula of the Upper Zone on a Porphyritic Hill.

Ranunculus repens.
Cardamine pratensis.
Sagina procumbens.
Stellaria uliginosa.
Cerastium triviale.
Viola palustris.
Rubus chamæmorus.
Potentilla tormentilla.
Galium saxatile.
Saxifraga stellaris.
Chrysosplenium oppositifolium.
Montia fontana.
Campanula rotundifolia.
Calluna vulgaris.
Vaccinium myrtillus.
vitis-idæa.

Euphrasia officinalis.
Empetrum nigrum.
Rumex acetosa.
Luzula sylvatica.
multiflora.
Eriophorum vaginatum.
angustifolium.
Carex rigida.
stellulata.
Aira flexuosa.
Anthoxanthum odoratum.
Agrostis vulgaris.
Poa annua.
Festuca ovina.
Nardus stricta.
Lastrea dilatata.
Blechnum boreale.
Lycopodium selago.
alpinum.

We find that several of the common pascual plants do not ascend nearly so high amongst the Cheviots as in the limestone dales. Several instances of this will be noticed in our list of species, of which we may mention here *Bunium flexuosum*, *Heracleum spondylium*, *Apargia hispida*, and *Rhinanthus crista-galli*, none known on porphyry above 350 yards, but ascending in the limestone dales to 600 or 650 yards. There are a few species which with us are either peculiar to the porphyry and basalt, or more abundant about them than anywhere else. Mr. Tate has mentioned most of them already, and I may add to his list *Polemonium cæruleum* as peculiar and as preferent, *Spergularia rubra*, and *Filago minima*. Of the Flora of our basaltic crags, the following list, which contains all the species noted upon the face, and on the slope, and amongst the debris of the dike, where it stands out conspicuously amongst the low moors west of Kyloe, is a fair illustration.

Florula of a Lower Zone Basaltic Crag.

Thalictrum flexuosum.
Viola sylvatica.
Helianthemum vulgare.
Ulex europæus.
Spartium scoparium.
Lotus corniculatus.
Euonymus europæus.
Rosa spinosissima.
Rubus umbrosus.
radula.
Prunus spinosa.
Sedum acre.
Lonicera periclymenum.
Hedera helix.
Galium cruciatum.
verum.
Solidago virgaurea.
Hieracium vulgatum.
Achillea millefolium.
Calluna vulgaris.

Erica cinerea.
Vaccinium myrtillus.
Pyrola media.
Ilex aquifolium.
Thymus serpyllum.
Teucrium scorodonia.
Quercus robur.
Juniperus communis.
Convallaria polygonatum.
Triodia decumbens.
Brachypodium sylvaticum.
Agrostis vulgaris.
Festuca ovina.
Aira caryophyllea.
præcox.
Pteris aquilina.

Of the slate rocks we have no large or characteristic development within our bounds, but we have, near at hand, in the Lake district, a very considerable range of hills, where beds of this class cover wide surfaces. Unlike the porphyry and basalt, the slate rocks exclude absolutely the special limestone plants; but like the porphyry and basalt, they are much less heathery than the sandstone, with but little peat upon their surfaces, and with clear transparent streams, and some of the pascual plants do not ascend so high amongst them as with the limestones. But on the other hand, as they rise to a greater height than the hills formed of any of the other three kinds of rock, and present a greater variety of surface in the Upper zone, many plants ascend higher amongst them than anywhere on the east side of the island, and they furnish several boreal plants which we do not get in the east at all. For comparison with the two upper zone florulas already enumerated, we give one for a characteristic crag of the slate formation, and have selected for that purpose a list of species noted on the face of the well-known Striding Edge cliff, which rises from the banks of the Red Tarn, on the west side of Helvellyn, at an elevation above sea level of from 800 to 950 yards.

Florula of an Upper Zone Slate Crag.

Thalictrum alpinum.
Anemone nemorosa.
Cardamine pratensis.
Viola sylvatica.
palustris.
Alchemilla vulgaris.
alpina.
Pyrus aucuparia.
Cerastium triviale.
alpinum.
Saxifraga nivalis.
hypnoides.
stellaris.
aizoides.

NORTHUMBERLAND & DURHAM
Divided into Districts founded on the River Drainage.
I. TWEED & TILL DISTRICT
II. NORTH EAST ,,
III. ALN ,,
IV. COQUET ,,
V. WANSBECK ,,
VI. NORTH TYNE ,,
VII. SOUTH TYNE & ALLEN ,,
VIII. SOUTH EAST ,,
IX. DERWENT & TYNE ,,
X. WEAR ,,
XI. TEES ,,
CHEVIOTLAND
TYNELAND
DURHAM
BERWICKSHIRE
ROXBURGH SHIRE
CUMBERLAND
WESTMORELAND
YORKSHIRE
NORTH DURHAM
Berwick on Tweed
Spittal
Holy Island
Staples Islands
Fern Islands
Coquet Island
Bamburgh
Beadnel
Dunstanburgh
Alnwick
Alnmouth
Warkworth
Rothbury
Cresswell
Morpeth
Blyth
Seaton Delaval
St. Mary's Island
Tynemouth
North Shields
South Shields
Newcastle
Gateshead
Hexham
Sunderland
Durham
Hartlepool
Seaton Carew
Stockton on Tees
Darlington
Yarm
Barnard Castle
Bishop Auckland
Alston
Allenheads
Wooler
Cheviot
Kelso
Coldstream
Tweed R.
Teviot R.
Till R.
Coquet R.
Wansbeck R.
Blyth R.
Derwent
Wear R.
Tees R.

Saxifraga oppositifolium.
Oxalis acetosella.
Chrysosplenium oppositifolium.
Galium saxatile.
Sedum rhodiola.
Sausserea alpina.
Hieracium chrysanthum.
Campanula rotundifolia.
Vaccinium myrtillus.
vitis-idæa.
Euphrasia officinalis.
Thymus serpyllum.
Rumex acetosa.
Oxyria reniformis.
Juncus squarrosus.
triglumis.
Carex stellulata.
rigida.
Anthoxanthum odoratum.
Poa annua.
Festuca ovina.
Aira flexuosa.
Allosorus crispus.
Lastrea dilatata.
filix-mas.
Cystopteris fragilis.
Lycopodium alpinum.
selaginoides.

The following are the principal species which are conspicuously more frequent amongst the Lake hills than in the east, those marked with a star not being Northumberland, Durham, or North Yorkshire plants at all.

Nymphæa alba.
Meconopsis cambrica.
*Silene acaulis.
*Alchemilla alpina.
*Impatiens noli-me-tangere.
*Circæa alpina.
*Saxifraga oppositifolia.
Sedum rhodiola.
anglicum.
purpureum.
Cotyledon umbilicus.
Jasion montana.
*Lobelia Dortmanna.
Festuca sylvatica.
*Salix herbacea.
*Isoetes lacustris.
Allosorus crispus.
*Juncus filiformis.
Hypericum androsæmum.

CHAPTER II.

CLIMATOLOGY, BY JOHN G. BAKER.

Zones of Altitude.—The difference in mean annual temperature between the equator and line of perpetual snow is about 55° Fahrenheit, which is a lowering of rather less than one degree of temperature to a degree of latitude. On the equator at sea-level

there is a regular temperature, all the year round, of from 75° to 80° in the shade. An elevation of 100 yards causes, in all latitudes and climates, to speak in round numbers, a lowering of one degree of mean temperature; and for this reason it is often possible, in mountainous intertropical regions, to pass through, in a single day's excursion, a range in temperature equal to that which there is normally between a tropical and arctic station. At the base of the Himalayas, for instance, we may begin the day amongst tree-ferns and palms, climb through a belt of oaks, and chestnuts, and magnolias, and a higher belt of pines and rhododendrons, to a region where no trees can exist, and only mosses, lichens, saxifrages, and gentians grow on the edge of the fields of perpetual snow, and then return again in the evening or next day to the palms and tree-ferns. Even within the compass of Britain we have more than one-third of this whole range of 55°. The difference in mean temperature at sea-level, along the east coast, is not more than 5°; but between the extreme points of the island, say the Lands End and the peak of Ben-na-muic-dhui, the difference is not much under 20°, the mean temperature being 52° for the one station, and not much over freezing-point for the other. In his elaborate work, called *Cybele Britannica*,* our principal authority on botanical geography, Mr. H. C. Watson, has divided the surface of the island into two regions of temperature, as modified partly through latitude and partly through altitude, and subdivided each of them into three zones, each of which covers a range of about 3° of mean annual temperature. The upper region he calls the Arctic, and the lower one the Agrarian region, and the boundary between them, which is at an elevation of 600 yards in Wales and the North of England, and descends to 450 yards in the Central Scotch Highlands, is marked by the line of limit of the possible cultivation of grain, which corresponds to the line of upper limit of several familiar wild plants, of which *Pteris aquilina*, *Ranunculus bulbosus*, *Nasturtium officinale*, *Lolium perenne*, and *Geranium molle* are examples. The six zones he calls Super, Mid, and Inferarctic, Super, Mid, and Inferagrarian.

* *Cybele Britannica;* or British Plants and their Geographical Relations, in four Vols. London: Longmanns, 1847–1859.

The Inferagrarian zone embraces all the wide area south of the estuaries of the Dee and Humber, with the exception of some of the Welsh, Cornish, and Devonshire hills. There are a large number of species peculiar to it, of which *Clematis vitalba* is the most noteworthy. The Midagrarian zone includes the low country in the North of England and southern half of Scotland, and the Superagrarian zone the low ground of the North of Scotland; and both of them belts of corresponding temperature in the hill-country of the more southern latitudes. In some counties, in at least half of the English ones, for instance, we get only one out of these six zones; but there are at least two of them in any county where the hills reach a height of 1000 feet. In our own two counties, beginning to count from below, we get the second, third, and fourth, but not the first, fifth, and sixth. We propose, in the present work, to call these zones which we have simply Lower, Middle, and Upper, and to regard the contour-lines of 300 and 600 yards above sea-level as forming the boundary between them; and these will be the same as Watson's Midagrarian, Superagrarian, and Inferarctic zones.

Mean Temperatures in the Shade.—The following table of mean temperatures is taken from the Reports of the Registrar General, from 1860 to 1864 inclusive. These tables, which are published quarterly by Government, under the editorship of Mr. Glaisher, contain regular observations from a large number of stations scattered up and down the island, and, gathered together, furnish the most complete and reliable data upon its climate which are in existence. Although only four of the stations come within the limits of our field of study, it fortunately chances that these are excellently adapted for showing what we want to know, one of them, North Shields, being on the sea coast; a second, Bywell, inland, in a sheltered position, at a very trifling elevation; a third, Alnwick (the observations are made at High House, 350 feet above sea-level), more northern and exposed; and the fourth, Allenheads (1350 feet above sea-level), being the most elevated locality in Britain where careful thermometric registration has been carried on for any considerable length of time. To these

we have added for comparison the figures for York, Greenwich, and Helston during the same period.

MEAN TEMPERATURES IN THE SHADE.

	Helston.	Green-wich.	York.	Bywell. J.Dawson	Allen-heads. T.Bewick	N. Shields R.Spence.	Alnwick. Mr. Scott.
January.....	44·1	38·4	37·3	37·3	33·1	37·2	37·5
February ...	44·1	38·9	38·1	38·5	33·9	38·1	38·0
March	45·3	41·2	39·2	39·6	34·7	38·4	39·2
April	50·9	49·5	47·9	46·6	42·1	43·9	44·9
May	54·1	54·3	52·1	51·5	46·9	48·6	49·0
June	57·2	58·0	56·8	55·4	51·5	52·8	52·4
July	60·6	61·4	59·8	58·4	53·7	57·2	52·4
August	60·0	60·2	57·1	57·3	52·2	55·4	54·0
September...	58·6	58·0	54·9	55·7	50·6	53·3	52·4
October.....	54·1	51·2	49·1	49·2	44·2	47·3	47·4
November...	47·3	43·1	41·3	42·0	37·7	41·9	40·5
December ...	46·9	41·9	41·9	42·6	37·5	41·8	41·2
Mean of the Year	51·9	49·7	48·0	47·8	43·2	46·3	45·7

Reckoning by seasons instead of months, taking December, January, and February as winter, and the others in order from this as a starting point, we obtain the following result:—

MEAN TEMPERATURE OF THE FOUR SEASONS.

	Helston.	Green-wich.	York.	Bywell.	Allen-heads.	North Shields.	Alnwick.
Winter	45·0	39·4	39·1	39·5	34·8	39·0	38·9
Spring	50·1	48·3	46·4	45·9	41·2	43·6	44·4
Summer.....	59·3	59·9	57·9	57·0	52·5	55·1	52·9
Autumn.....	53·3	50·8	48·4	49·0	44·2	47·5	46·8
Difference between Winter and Summer	14·3	20·5	18·8	17·5	17·7	16·1	14·0

In the first place, comparing Bywell with Allenheads, we see that the difference, season by season, is 4·7, 4·7, 4·5, and 4·8 for a difference in level of 1300 feet, which quite bears out what we said before, that to speak in round numbers, we may reckon that

mean temperature falls as we ascend the hills at the rate of 1° for every 100 yards. For the interior of the country, from London northward to Edinburgh, we may take from 47° to 49° as a fair average, 47° for the South of Scotland, 48° for the North of England, and 49° for the Midland counties: the difference between summer and winter being usually from 18° to 20°. On the sea coast the difference between summer and winter is smaller than in the interior, and the mean temperature generally a shade higher; but in our table this last character, as between Bywell and Shields, does not hold good. We will take then the annual average of our Lower zone at from 48° to 45°, of the Middle zone at from 45° to 42°, and of the Upper one at 40° or 41°.

The great characteristic of the climate of Britain, as compared with that of other parts of the North Temperate zone, is its equability, the absence of extreme degrees of either heat or cold, and the consequent smallness of the difference there is between winter and summer. We shall see shortly what an important influence this has upon the distribution of plants. Even within the compass of England we can trace palpably the influence of the sea in cutting off the extremes in both directions. Of course, it is on the west side of the island that this influence operates most powerfully, and we see from the table just given, that although Helston is 6° warmer in winter than Greenwich or York, it is rather colder than the former and only $1\frac{1}{2}$° warmer than the latter in summer; at Shields and Alnwick that the difference between summer and winter is only 16° and 14°. The winter is not materially colder at Newcastle than at London; but all the other seasons are, though the difference, when expressed in figures, is probably much smaller than any one who has not studied it as a question of figures will be likely to suppose. The summer is warmer in the interior of the south-east of England than anywhere else in Britain, rising in some places to an average of a little over 60°. The autumn, both in the north and south, comes very near to the average of the whole year, being generally a little above it. But if we turn to the Continent, we shall see how much colder the winters and warmer the summers are in proportion, and how the divergence increases as we pass into the interior.

MEAN TEMPERATURES OF THE YEAR, AND OF SUMMER AND WINTER, UPON THE CONTINENT.

LOCALITY.	Average of whole Year.	Summer.	Winter.	Difference between Summer and Winter.
Umea, Lapland	35	57	14	41
Stockholm	42	62	25	37
St. Petersburg	38½	62	16	46
Moscow	38½	66	11	55
Copenhagen	47	64	31	33
Berlin	47	64	31	33
Hamburgh	48	64	32½	31½
Warsaw	48	68	30	38
Paris	51	65	38½	26½
Vienna	50	68	32	36
Geneva	50	63	35	28
Munich	48	65	30½	34½
Madrid	59	77	43½	33½
Milan	55	73	36	37
Naples	63	75	50	25

It is only those parts of Europe that come within the immediate influence of the Mediterranean that have a warmer January than England. With us the mean temperature of the month at sea-level ranges from 32° to 41°. In France the range is almost exactly the same. In some parts of Spain the month reaches 50°; but passing westward from France into the heart of the great mass of the Continent it falls steadily. From the Black Sea to the Baltic it is from 23° to 32°. At Christiania, Stockholm, and Upsala it is 23°. At Moscow, which is in the same parallel of latitude as Edinburgh, it falls to 14°. The difference in position between Edinburgh and Moscow makes a difference in temperature, to the advantage of the former, of 26°. But take July and the difference is all the other way. The average temperature of England in July is from 59° to 63°; in France it is from 64° to 74°; in Spain from 68° to 77°; in Central Europe 63° to 72°; at Stockholm 61°; at Moscow 65°. If we want to match Edinburgh now we shall find a corresponding temperature at Tornea, in Lapland, which is within the Arctic circle, or at Archangel, or at Yakutsk, in Siberia, where the cold in winter is utterly beyond anything of which we here in England can form an idea, the temperature being as far below that of Moscow,

not as a figure of speech, but as measured by the thermometer, as that of Moscow is below that of Edinburgh.

Daily Range of Temperature.—We have been speaking so far entirely of what tables of temperature usually deal with, mean temperatures month by month in the shade. We have said nothing at all of the range of temperature during each day, and must next direct our attention to this. The following table, thanks to the very valuable set of observations conducted under Mr. Sopwith's auspices, will tell us substantially all that we need to know here. For Bywell and Allenheads it gives in the first column the average excess, month by month, of the daily maxima in the sun over those in the shade, in the second the average fall of the nightly minima on the grass below those of the air, in the third the average daily range in the shade; and if we add these three figures together we shall get, in the fourth column, the total daily range to which a plant will be exposed at the surface of the soil, day by day, when it grows in an unsheltered position.

DAILY RANGE OF TEMPERATURE IN SHADE AND EXPOSURE.

	BYWELL, 1857-60. J. DAWSON.				ALLENHEADS, 1857-60. T. BEWICK.			
	Excess of average daily maxima in sun over those in the shade.	Fall of average daily minima on grass below those of the air.	Average daily range in the shade.	Total average daily range in exposure.	Excess of average daily maxima in sun over those in the shade.	Fall of average daily minima on grass below those of the air.	Average daily range in the shade.	Total average daily range in exposure.
January	3·0	6·1	10·9	20·0	3·1	1·6	9·0	13·7
February.....	7·8	7·2	12·3	27·3	7·1	2·3	9·6	19·0
March	13·6	6·1	12·7	32·4	15·1	1·6	10·6	27·3
April	23·1	7·3	15·5	45·9	20·4	3·6	12·1	36·1
May.....	17·3	7·2	13·8	38·3	30·4	3·5	16·2	50·1
June	21·7	7·3	14·5	43·5	28·4	3·0	15·5	46·9
July.....	22·8	8·6	14·4	45·8	24·7	5·3	14·6	44·6
August	20·0	9·1	14·4	44·4	25·1	4·9	13·6	43·6
September ...	17·11	9·7	14·4	41·2	21·7	6·4	13·2	41·3
October	6·5	7·2	12·5	26·2	15·0	3·5	10·6	29·1
November ...	4·3	6·6	12·9	23·8	6·7	2·9	9·5	19·1
December ...	5·3	6·5	12·0	23·8	0·6	1·9	9·7	12·2
	13·6	7·4	13·4	34·4	16·6	3·4	12·0	32·0
Winter.....	5·4	6·6	11·7	23·7	3·6	1·9	9·4	15·0
Spring.....	18·0	6·9	14·0	38·9	22·0	2·9	13·0	37·9
Summer	21·8	8·3	14·4	44·6	28·1	4·4	14·6	45·0
Autumn	9·3	7·8	13·3	30·4	14·5	4·3	11·0	29·8

This shows us clearly what an immense power the direct influence of the sun exerts, and consequently how different is the position with regard to temperature of a sheltered and unsheltered station.

Extreme Degrees of Temperature.—We have spoken as yet altogether of average monthly temperatures, but in connection with our present inquiry, single extreme temperatures, and especially extreme minima, must not be altogether passed over. It will, of course, be gathered, from what has been already said, that extremes in each direction are much smaller in England than on the Continent. The most striking point about the extreme degrees (and this applies particularly to minima) is, how much smaller they are near the sea than in the interior. In England, in very cold weather, the extreme degrees are just as likely to run from north to south as from east to west, so that there is no decided and uniform advantage between say the upper part of the course of the Thames over Tynedale. The part of England which has the decided advantage in this respect is the south-west, and even on the coast the extremes are much smaller on the west than on the east. If we compare an extreme summer with an extreme winter, the result will usually be something like the following:—

MAXIMUM AND MINIMUM TEMPERATURES IN THE SHADE.

LOCALITY.	Maximum in the month of July, 1859.	Minimum on the night of Dec. 25, 26, 1860.	Difference between the two.
Helston	90	32	58
Ventnor	79	24	55
Greenwich	93	8	85
Derby	83	2	81
Nottingham	89·5	—8	97½
Liverpool	82	16	66
Manchester	85	—3	88
Wakefield	90	—2	92
Leeds	90	6	84
York	82	—4	86
Scarbro'	77·5	16	61½
Allenheads	79	8·3	70·7
Bywell	85½	3½	82
North Shields	81·4	6·8	74·6

Influence of Temperature on Plant-distribution.—The influence of temperature on the distribution of plants is a complicated matter to understand and explain. We must remember, in the first place, that in some plants the root, and in shrubby and woody plants the stem also, lasts for many years, and bears many successive crops of flowers and seeds; and that where there is only one crop produced, the plant has sometimes to live through the winter and sometimes not. A species can only grow where it gets heat enough to perfect its seeds; and if too much heat or too much cold comes whilst it is growing it will wither and die. When the thermometer sinks down to freezing-point all vegetation is suspended, but the degree of heat at which different plants begin to grow is very various. This is a matter of the highest importance, and one that should be understood clearly, that all degrees of temperature below a special point, a point which is high up in the scale for some species, low down for others, do not help a plant to grow, to elaborate its sap, to develop its leaves and flowers, to perfect its seeds. Each species, it has been said, is a thermometer of which the zero is the minimum of temperature at which vegetation is possible for it. Let us take an instance and illustrate this by figures, for although from the complicated elements that have to be taken into account such figures cannot possibly be exact, yet we can show in that way the most clearly what we mean. It is estimated that 43° Fahrenheit is the zero of the common barley. Suppose a crop of barley to be planted in October. Recurring to our tables, we find the average highest daily temperature of the month is 53° in the shade, 59° in the sun. The seeds germinate, and the little shoots show themselves above the surface, bright and green. November comes, when the shade temperature falls to 45°, that in the sun to 49°. In December the figures are 42° plus 5°, in January 40° plus 3°, that is, in the full sun, in the warmest part of the day, the heat does not reach high enough to influence the barley at all. February is January over again. In March the temperature in the shade is not much higher, but the influence of the sun is greater. In April it is 9° above 43° in the shade, and 17° more in the sun, and the young plants waken from their

winter's sleep, roused like the sleeping princess in the story, into new life and vitality. The zero of a plant is generally the grand crowning fact upon which its range depends. It is evident, that within considerable limits, the time over which the heat it needs is spread is not material. If we take a handful of seeds and sow half of them under the shadow of a tree, and the other half in a sunny bed, the plants in the exposed place will flower and seed the earliest. The difference in the time of ripening the seed, in some experiments which De Candolle performed at Geneva, was eight days for the common cress, sixteen days for flax, twenty-nine days for candytuft. And he even, in his great handbook of Geographical Botany,* attempts to express in figures the amount of heat which different species need to bring them to perfection, estimating, for instance, that the zero of the beech is 5 centigrade, and that it requires 2500°; that the holly needs 2200°, parting from 7°; *Dianthus Carthusianorum* 2500°, parting from 6°; or to take a more southern plant, *Chæmarops humilis*, the only wild European palm, 2700°, parting from 19°. It seems clear that chickweed, groundsel, and a number of northern and alpine plants, have a zero not much above freezing point, many of our wild British species probably from 40° to 45°, but that, in many tropical species, it goes up to 60° Fahrenheit or more.

The temperatures, then, which exercise a paramount influence on plant-distribution, are the sums of summer heat over and above various points. It will be clear, from what has been explained already, that there is no essential connection between these and the annual means, and that the relations of one to the other are excessively variable. We cannot illustrate better how this state of things operates than by again recurring to the cultivated cereals. In the Andes, where the temperature is nearly the same all the year round, they cannot grow grain much above 7000 feet above sea-level, where the annual mean is 55°. In Britain we have to stop at about 44°, and in Switzerland they stop at 40°; but in Norway wheat goes up to the 64th, oats to

* Geographie Botanique raisonnee, ou exposition des faits principaux et des lois concernant la distribution geographique des plantes de l'epoque actuelle, par M. Alph. De Candolle 2 Vols. Paris: Masson, 1855.

the 65th, rye to the 67th, and barley to the 70th parallels of latitude, where the annual temperature is 32°, or a little less. They can grow grain in places at least 12° lower in mean temperature than we can in England, and to get in Europe a mean of 55° we should have to go to Madrid or Milan.

But take the polar limits of plants liable to be killed off by frost, and the balance then is altogether in our favour. The holly, for example, is generally nipped where the thermometer falls to Fahrenheit's zero. With us it is common enough in the lower zone, and extends north as far as Sutherlandshire and the Hebrides. It is restricted to the south-western half of the Continent. In the Scandinavian peninsula it is confined to the South of Norway. It does not enter at all into the Russian list. From Denmark and Holstein its polar limit strikes across the Continent diagonally, by way of Mecklenburg and Austria, to Thrace and Macedonia, and so to the shores of the Black Sea. Our common furze (*Ulex europæus*) is still more decidedly western in its tendencies. It avoids Norway, Sweden, Russia, Poland, Austria, Turkey, and Greece altogether. Its polar limit runs across the Continent from Holstein and Mecklenburg to the Tyrol, in a line nearly north and south. The Killarney strawberry-tree (*Arbutus unedo*) is confined to the South of France, Spain, Italy, Greece, and Turkey; the Connemara heath (*Dabœcia polifolia*) to Spain, Portugal, and the West of France. In general terms, the polar limit of species liable to be killed off by frost runs across Europe, from north-west to south-east, diagonally with the parallels of latitude; and to sum up, in a single comprehensive phrase, the relations of the British to the Continental Flora, we may say, that the north limits of the plants, from the nature of the case, as regulated by temperature, radiate from our island like the spokes of a wheel from the axis.

Area of the Zones of Altitude.—Only two of the Cheviot peaks rise distinctly into the Upper zone, Cheviot itself, which reaches within a few feet of 900 yards above sea-level and the neighbouring peak of Hedgehope, which attains nearly 850 yards. Hedgehope is a mere shoulder of hill, but Cheviot has a flat

plateau above 800 yards in elevation, which is not less than a mile across from east to west. Besides this, the Upper zone includes the summit of about a dozen of the peaks that encircle the head of the Wear, beginning with Stangend Rigg and Kilhope Law, just above Allenheads, and curving round by way of the county boundary as far east along the watershed between Wear and Tees as Newbiggin and Swinhope. To get into this Upper zone we have always to rise quite out of the ravines, and there is very little rock within its area, so that the range of variation in plant-stations which it furnishes is very small.

The line of limit between the Middle and Lower zones extends up the College Burn to the farm-houses (Goldscleugh and Dunsdale), at the very foot of Cheviot. The Newton Tors rise distinctly into the Middle zone, but Yevering Bell only just reaches it, and what is called Wooler Common, i.e., the portion of the Cheviot range outside the Common Burn, is all below 300 yards. In the Caldgate ravine the Langlee-ford farm-house, at the foot of Hedgehope, is 250 yards above sea-level. From North Middleton Moor the boundary line between the two lower zones stretches along the steep Cheviot slope above Ilderton, Roddam, Alnham, and Biddleston to Alwinton. The highest point of the range of sandstone hills east of the Till is within a few feet of 350 yards, and the moors north of Rothbury, and east of the hollow between Alwinton and Alnham, reach about the same altitude. North of the Coquet there is a wide extent of high undulated moorland, that forms part of the great Cheviot mass, and begins just over Alwinton; but the 300 yards contour line only touches the stream considerably west of Windyhaugh. Between the Coquet and Reedwater the ridge reaches continuously into the Middle zone from the county boundary to Rothbury, a distance of 20 miles. In the wide tract between the Reedwater and South Tyne the area that reaches into the Middle zone is small. North of the North Tyne it includes the ridge along the county boundary from Carter Fell to the moors above Kielder, with spurs towards the south-east; but between the two branches of the Tyne, the country of the Roman wall and the loughs, only a few of the highest ridges and peaks. But

south of the South Tyne the hills soon rise to a considerable height. No portion of the main branch within Northumberland is high enough to reach the Middle zone; but the moor between that and the Allen rises into it within a short distance of Halt-whistle and on the other side of the Allen above Catton. The 300 yards contour-line strikes the Allen about 3 miles south of Allentown, and from Catton Moor curves round the head of the Devil's Water along the edge of Slealey Moor to Shotley. South of the Derwent the watershed ridge is Middle zone as far east as Cold Rowley, a distance of 15 miles from the head of the river, and north of the Wear as far east as Wolsingham. The contour line strikes the Wear 15 miles west of this at St. John's Chapel; but on the south of the stream there is again a continuous high ridge, which is Middle zone as far east as Wolsingham, and a short distance beyond Eglestone; and finally, the contour-line strikes the Tees between Wince Bridge and the High Force. The whole area that reaches into the Middle zone is probably not one-twentieth part of the area of the two counties.

Ascending Limits of Wild Plants.—Of the indigenous plants of Britain, 37 per cent. are, to speak in general terms, distributed throughout the length and breadth of the island, whilst 43 per cent. of the species show a decidedly southern tendency, and 17 per cent. are either northern in their tendencies, or at any rate absent from the south and found northward principally amongst the hills. We may safely connect the 43 per cent. with the warmer temperatures, and the 17 per cent. with colder ones, and, of course, such of the former as come within our bounds, are almost all restricted to the low level country. As we ascend from one level to another the number of species decreases rapidly, partly through climate, and partly because at each successive step there is a smaller extent of surface, and the range of variation in station grows rapidly smaller also. If we attribute the running out to climate entirely we shall make a mistake, as we may see by studying the altitudes reached by the same plants in other parts of the island. For instance, with us there are no trees, either wild or planted, above 600 yards, but in Scotland

the juniper ascends to 900 yards, the rowan almost as high, the Scotch fir, birch, raspberry, ash, hazel, gale, aspen, *Rosa villosa*, *spinosissima*, and several willows, to 500 yards and upwards, 500 yards under the northern latitude being more than equivalent to 600 yards with us. The following table, therefore, must be considered with this qualification. It shows the number of species which we have observed at the different altitudes, and we give also, for each leap of 100 yards up to 600 yards, a list of a dozen common plants which disappear there.

In Northumberland and Durham there are below	150	yards	882	species.	
,,	,,	at 150	,,	581	,,
,,	,,	at 200	,,	541	,,
,,	,,	at 250	,,	495	,,
,,	,,	at 300	,,	450	,,
,,	,,	at 350	,,	407	,,
,,	,,	at 400	,,	375	,,
,,	,,	at 450	,,	326	,,
,,	,,	at 500	,,	300	,,
,,	,,	at 550	,,	212	,,
,,	,,	at 600	,,	135	,,
,,	,,	at 650	,,	108	,,
,,	,,	at 700	,,	66	,,
,,	,,	at 750	,,	54	,,
,,	,,	at 800	,,	34	,,
,,	,,	at 850	,,	20	,,

Total number of species of	Lower	zone.....	920
,, ,,	Middle	,, ...	418
,, ,,	Upper	,, ...	108

Stop upwards at 100 yards.—*Thalictrum flavum*, *Coronopus Ruellii*, *Lythrum salicaria*, *Heliosciadium nodiflorum*, *Bryonia dioica*, *Convolvulus arvensis*, *Nepeta cataria*, *Ballota nigra*, *Erythæa centaurium*, *Tamus communis*, *Pulicaria dysenterica*, *Hordeum pratense*.

Stop upwards at 200 yards.—*Lepidium campestre*, *Papaver Rhœas*, *Barbarea vulgaris*, *Malva sylvestris*, *Epilobium hirsutum*, *Eupatorium cannabinum*, *Linaria vulgaris*, *Lamium album*, *Lithospermum arvense*, *Rumex conglomeratus*, *Ophioglossum vulgatum*, *Trifolium arvense*.

Stop upwards at 300 yards.—*Cardamine amara, Sisymbrium officinale, Viola hirta, Hypericum perforatum, Rubus fruticosus, Geranium dissectum, Trifolium procumbens, T. minus, Arctium lappa, Mentha arvensis, Typha latifolia, Sparganium ramosum.*

Stop upwards at 400 yards.—*Cerastium glomeratum, Ulex europæus, Spartium scoparium, Prunus spinosa, Lotus major, Geum urbanum, Galium cruciatum, Fraxinus excelsior, Pyrus malus, Ulmus montana, Viburnum opulus, Quercus robur.*

Stop upwards at 500 yards.—*Capsella bursa-pastoris, Lonicera periclymenum, Hypericum pulchrum, Prunus padus, Rosa canina, Juniperus communis, Populus tremula, Betula alba, Corylus avellana, Angelica sylvestris, Senecio aquaticus, Taxus baccata, Erica cinerea.*

Stop upwards at 600 yards.—*Ranunculus flammula, Polygala vulgaris, Stellaria graminea, Oxalis acetosella, Epilobium montanum, Cratægus oxyacantha, Parnassia palustris, Heracleum spondylium, Carduus lanceolatus, Salix caprea, Lastrea filix-mas.*

The following is a list of the Northumberland and Durham species, about half the total number, which are northern or montane for Britain as a whole, arranged according to the order in which they are to be met with as we ascend from the low country up amongst the hills.

Below 100 yards.—*Thalictrum minus, T. flexuosum, Trollius europæus, Thlaspi alpestre, Viola lutea, Arenaria verna, Stellaria nemorum, Geranium sylvaticum, Prunus padus, Sanguisorba officinalis, Ribes nigrnm, R. rubrum, R. grossularia, R. alpinum, Sedum villosum, Parnassia palustris, Ligusticum scoticum, Myrrhis odorata, Galium boreale, Crepis paludosa, Carduus heterophyllus, Campanula latifolia, Pyrola minor, Lamium intermedium, Galeopsis versicolor, Mertensia maritima, Pinguicula vulgaris, Primula farinosa, Salix pentandra, S. nigricans, S. laurina, S. phylicifolia, Listera cordata, Cypripedium calceolus, Allium scorodoprasum, Gagea lutea, Blysmus rufus, Scirpus uniglumis, Carex filiformis,*

Sesleria cærulea, Melica nutans, Aspidium lonchitis, Equisetum hyemale, E. umbrosum, Lycopodium selaginoides, Elymus arenarius.

At 100 yards.—*Drosera anglica, Callitriche autumnalis, Hieracium argenteum, H. crocatum, H. prenanthoides, Sagina subulata, Gnaphalium dioicum, Andromeda polifolia, Pyrola media, Empetrum nigrum, Carex dioica, C. limosa, Polypodium phegopteris, P. dryopteris.*

At 150 yards.—*Potentilla alpestris, Saxifraga aizoides, S. stellaris, Meum athamanticum, Galium sylvestre, Crepis succisæfolia, Hieracium pallidum, H. cæsium, H. gothicum, H. corymbosum, Vaccinium vitis-idæa, V. uliginosum, Trientalis europœa, Rumex aquaticus, Habenaria albida, Carex pauciflora, C. irrigua, Allosorus crispus, Asplenium viride, A. germanicum, A. septentrionale, Equisetum variegatum.*

At 200 yards.—*Saxifraga hypnoides, Linnæa borealis, Hieracium lasiophyllum, Arbutus uva-ursi, Pyrola secunda, Polemonium cæruleum, Convallaria verticillata, Festuca sylvatica.*

At 250 yards.—*Potentilla fruticosa, Polygonum viriparum.*

At 300 yards.—*Thalictrum alpinum, Cornus suecica, Hieracium anglicum, H. iricum, Melampyrum sylvaticum, Lycopodium alpinum.*

At 350 yards.—*Gentiana verna, Bartsia alpina.*

At 400 yards.—*Sedum rhodiola, Saxifraga hirculus, Tofieldia palustris, Carex capillaris.*

At 450 yards.—*Draba incana, Woodsia ilvensis.*

At 500 yards.—*Rubus chamæmorus, Epilobium anagallidifolium, Juncus triglumis.*

At 550 yards.—*Carex rigida.*

The Climate as tested by cultivated Plants.—The following paragraph, from Winch's Essay,* will convey as good an idea

* An Essay on the Geographical Distribution of Plants through the Counties of Northumberland, Cumberland, and Durham, by N. J. Winch. Newcastle, 1825.

as we can give of the power of the heat in summer. "Seven different species of fruit-trees ripen their fruit in the southern counties, which seldom do so in this latitude: these are the vine, the fig, the quince, the medlar, the walnut, the chestnut, and the mulberry. This may be ascribed, in some measure, to the presence of cold easterly winds during the spring months, destroying the blossoms; to the low temperature of our autumns, which prevents the young wood from hardening and maturing the buds enveloping the flowers in embryo; but more especially to the want of a continuance of sufficient heat, during the summer, to bring the fruit which is occasionally formed to perfection, for all these trees withstand the winter frost tolerably well in sheltered situations. The vine seldom flowers, and if by chance small grapes are produced, they soon drop off. The fig is seldom seen out of the hot-house, or against a hot wall, and is otherwise barren, except in the south-eastern corner of Durham; and speaking generally, the same may be said of the quince and medlar. These flower freely, and the latter has ripened its fruit twice during twenty years at Jesmond, near Newcastle. The walnut and chestnut stand in the same predicament; and even the filbert bears very sparingly. The mulberry is here a low stunted tree, but in hot summers bears abundance of small fruit, which in part comes to maturity, and is well flavoured."

Respecting the shrubs liable to be killed by frost in severe winters we need not say much, as the species are very much the same everywhere, along the east side of the island, between Edinburgh and London. The following are some of the commonest, those placed early in the list being the most liable to suffer. For fuller detail bearing upon this point, and facts, showing how some of them, in cases of severe frost, have stood better in the immediate vicinity of the sea, and in slightly elevated localities, than in low-lying inland stations, we may refer our readers to two papers, by Ralph Carr, Esq., in the third and fifth volumes of our Transactions.

Laurus nobilis, Cedrus Deodara, Viburnum tinus, Cryptomeria japonica, Rhamnus alaternus, Quercus ilex, Phillyrea latifolia, media, angustifolia, Cistus ladaniferus, Thuia filiformis, Aucuba

japonica, *Prunus lauro-cerasus*, *P. lusitanica*, *Arbutus unedo*, *Ilex aquifolium*, *Ulex europæus*, *Spartium scoparium*.

To the upper limits in Northumberland and Durham of the various cultivated plants we have paid special attention, because it seems likely that many of them are grown successfully with us under lower temperatures than they are anywhere else in the island. There is a great contrast in the height to which houses and cultivation reach between the Cheviots and the Durham and South Tynedale hills, owing, no doubt, to the broad open dales and more gradual slopes of the latter, and the attraction of their mineral treasures. In the whole Cheviot tract there are probably not more than a dozen farm houses at above 1000 feet, and the cultivation of grain stops at 200 or 250 yards. In Durham, the highest regularly-inhabited house which we have seen, is the farm-house of Grasshill, on the west of the peak of Highfield, which is just 2000 feet above sea-level. In West Allendale there is a small village, called Coal Cleugh, at from 1650 to 1700 feet; and in East Allendale some of the farm houses are nearly as high, and the considerable village of Allenheads, with a church, school house, mining office, and gentleman's hall and grounds, stands at a height of from 1300 to 1400 feet. The following is a list made during various visits to Teesdale, of the height at which the different trees grow, either in a wild or planted state, and to which the different kinds of grain and vegetables are cultivated.

At 2000 feet.—Rhubarb, potatoes, turnip. A crop of each of these grown by the Highfield farmer in the hollow of a disused limekiln.

At 1700 feet.—*Salix caprea*.

At 1650 feet.—*Rubus idæus*, *Pyrus aucuparia*, *Corylus avellana*, *Salix aurita*, *S. phylicifolia*, *Rosa tomentosa*, *Ribes rubrum*, *R. grossularia* (fruit poor).

At 1600 feet.—Oak, beech, spruce, sycamore, hawthorn, Wych elm, larch, Scotch fir.

At 1500 feet.—Juniper, *Prunus padus*, *Rosa canina*, *Salix fusca*, honeysuckle, aspen, *Mentha viridis*, gooseberry (fruit good).

At 1450 feet.—*Rosa spinosissima.*

At 1250 feet.—Apple, pear (planted eight years, flowers, but has not fruited), cabbage, potato field, spinach, *Ribes nigrum*, clover field, *Sinapis alba*, bean, radish, chives, carrot, lettuce, *Mentha gentilis.*

At 1100 feet.—Ivy.

At 1050 feet.—*Viburnum opulus*, *Rubus suberectus*, alder, strawberry, onion, leek, horse-radish, peas.

In Weardale our highest measurements for the cereals are—oats, 1340 feet; barley, 1000 feet; wheat, 750 feet; in Allendale, oats, 1600 feet; barley, 950 feet; wheat, 800 feet. In making a similar list to the above for Allendale, we had the kind and efficient help of Mr. Ralph Murray, of Allenheads, who spent, when we were staying at the village, in 1865, a considerable time in traversing with us Mr. Beaumont's extensive gardens and plantations, for the purpose of compiling it. Our first list is of the species noticed in the gardens at Coal Clough (1650–1700 feet), in West Allendale; and of Gill's House (1665 feet), and Shorngate House (1640 feet), in East Allendale, say, in round numbers, of species grown at 550 yards—

Fruits.—Plum, raspberry, red currant, black currant, *Rubus saxatilis.*

Vegetables.—Potato, rhubarb, turnip, cabbage, *Mentha viridis*, *M. gentilis*, *Anthemis nobilis*, wormwood, lettuce, carrot, cauliflower, *Tropæolum*, marjoram, onion.

Trees and Shrubs.—Sycamore, ash, larch, hawthorn, spruce, Scotch fir, Wych elm, *Syringa vulgaris*, *Salix viminalis*, *S. purpurea*, *S. Smithiana*, *S. phylicifolia*, *Rosa alba.*

Our next list relates to Mr. Beaumont's grounds, which are at an altitude of from 1370 to 1460 feet, facing the north, and cut off from the south by a ridge of high moorland.

Fruits ripen.—Strawberry, apple, peach, pear, cherry, plum, red currant, black currant, rasp, gooseberry.

Vegetables.—Peas, beans, asparagus, beet, sea kale (*Crambe*), broccoli, Brussels sprouts, cabbage, carrot, cauliflower, cress (*Lepidium sativum*), garlic, leek, lettuce, *Sinapis alba*, onion, parsley, parsnip, rhubarb, radish, rampion, salsafy, spinach, turnip, vegetable marrow, potato, basil, fennel, hyssop, lavender, marjoram, thyme, balm, sage.

Trees (have all lasted through several winters, but many not flowered.)—Alder, ash, beech, birch, horse chestnut, Wych elm, Balm of Gilead fir, black, white, and red American spruce, Scotch fir, silver fir, *Pinus austriaca*, *Cembra* and *laricio*, mountain ash, hazel, holly, hornbeam, laburnum, larch, *Acer campestre*, *Populus alba*, *nigra*, *dilatata*, common oak, Turkey oak, sycamore, *Pyrus Aria*, black thorn, hawthorn, walnut, *Salix fragilis*, *viminalis*, *Smithiana*, *pupurea*.

Ornamental Shrubs.—Sweet briar, *Berberis vulgaris*, *Mahonia aquifolium*, *Thuja occidentalis*, *Ribes sanguineum*, box, *Cornus sanguinea*, *Viburnum opulus*, *Lonicera caprifolium*, *Prunus lusitanica*, *P. lauro-cerasus*, holly, *Kerria japonica*, mezereon, lilac, privet, *Wellingtonia*, snowberry, Irish and common yew, white and yellow broom, ivy, juniper, *Azaleas* (*pontica*, &c.), rhododendrons, roses (*alba*, &c.).

Rainfall.—Of the six hundred and six British plants with a southern tendency, we find that one hundred and twenty-seven show a decided preference for the east, and seventy for the west side of the island, and this no doubt is principally to be explained by the fact that the former is drier, both above and below the surface of the earth. But, as the distribution of the rainfall through our province cannot be traced to have any appreciable

influence on the distribution of its plants, we will content ourselves with quoting here the figures for the various stations as they stand in the last Club report. The stations for which no altitude is given are very little above sea level.

PLACE.	Altitude in feet.	Number of years observed.	Annual rainfall in inches.
Darlington	140	2	20·7
Whorlton	450	2	25·3
Wallsend	.....	6	27·0
Wylam	96	11	27·7
Stamfordham	400	9	29·1
Bywell	87	9	28·0
Allenheads	1360	9	46·9
Park End, North Tyne	277	10	32·3
Glanton, foot of Cheviot	534	8	27·6
Cresswell	.....	9	22·4
Sunderland	.....	8	21·4

This is just as might be expected, the minimum along the coast, and the quantity growing gradually greater inland to the maximum in the vicinity of the western ridges.

Wind.—We ought not to pass entirely unnoticed the influence which the force of the wind has upon vegetation. Take a maritime station, like Shields, for instance, and compare it with a sheltered inland locality like Bywell, and it is probable that the force of the wind, as measured by an anemometer, is twice as great on the average of the whole year at the former place as at the latter. The consequence is, that along the whole coast, exposed as it is to the full force of the cold breezes of the east, trees of any kind can attain to a moderate height and luxuriance only in sheltered situations; and no doubt, the same reason causes our springs to be later, and our climate to be more unfavourable for herbaceous plants that love warmth and shelter, in comparison with Yorkshire and the Midland Counties, than the mere figures of temperature indicate. We shall have occasion, in another part of the work, to point out how rapidly, in Northumberland and Durham, the characteristically southern plants thin out.

CHAPTER III.

PHYSICAL GEOGRAPHY, BY J. G. BAKER.

Under this head we propose to go through, one by one, the districts founded upon the river-drainage as they stand in the map, and to attempt to describe briefly the most salient features of their physical geography. It is not without considerable hesitation that we lay before the members of the Club a summary of the notes which we have had, from time to time, the opportunity of making upon this head, hesitation arising from the feeling that a large proportion of them are better acquainted with the country about which we are writing than we are ourselves. But we hold strongly to the opinion that it adds very much to the interest and value of a local Flora, that the physical characters of the tract of country to which it relates should be explained, side by side with the enumeration of the plants; and we expect, of course, that this paper will meet the eyes of many to whom our wide sweeps of moor, lowland denes, streams and fields, and long line of craggy coast are ideals unrealized, and we trust also that it may help to recall pleasant memories of bygone excursions in the minds of those to whom these are amongst things familiar.

The total area of Northumberland is 1952 square miles. Its greatest length, from north to south, is 60 miles; its breadth, from Tynemouth to the Irthing, 54 miles; but in the northern part, opposite Wooler, not more than 24 miles. The area of Durham is 973 square miles; its greatest length 48 miles, and its breadth 39 miles. The total area of the two is 2925 square miles, which is about one-seventeenth of England exclusive of Wales, and one-thirtieth of Britain, exclusive of Ireland.

The towns of Northumberland are twelve in number—in the first rank Newcastle, then North Shields and Tynemouth, to all intents one, then the three old centres of feudal times, Alnwick, Morpeth, and Hexham; the others, Allenton, Belford, Bellingham, Haltwhistle, Rothbury, and Wooler, small country towns, of an almost entirely agricultural character. The towns of Durham are thirteen—Durham, Bishop Auckland, Barnard Castle,

Darlington, Gateshead, Hartlepool, Stockton, Sunderland, South Shields, Sedgfield, Stanhope, Staindrop, and Wolsingham. As the map will show, we have traced out eleven drainage districts, the first four of which correspond to the Cheviot-land vice-county* of Watson's *Cybele Britannica*, the second four to his southern division of Northumberland, which we may call Tyne-land, and the last three to the county of Durham. In round numbers we may say the area of Cheviot-land is 800 square miles, of Tyne-land 1150 square miles, and of Durham 950 square miles; and we would ask the special attention of our readers to these vice-counties, as we intend to give a separate list of the plants of each, or, to speak more accurately, to give, under each species, the initial letter C, N, and D of the vice-counties in which it grows. The districts which we have defined are as follows:—

1. Cheviot-land vice-county.
    1. Tweed and Till district.
    2. North-eastern district.
    3. Aln district.
    4. Coquet district.

2. Tyne-land vice-county.
    5. Wansbeck district.
    6. North Tyne district.
    7. South Tyne and Allen district.
    8. South-eastern district.

3. Durham (vice) county.
    9. Derwent district.
    10. Wear district.
    11. Tees district.

We give, in the first place, a table, showing the distribution of the one hundred and eight boreal species through the eleven drainage districts.

* Mr. Watson, in *Cybele Britannica*, divides Britain into one hundred and twelve of these vice-counties.

Thalictrum alpinum	...	...	...	...	...	...	...	...	...	...	11
minus	1	2	3	4	5	...	...	8	9	10	11
flexuosum	1	2	...	...	...	...	...	...	...	...	11
Trollius europæus	1	2	3	4	5	6	7	8	9	10	11
Thlaspi alpestre	...	...	...	...	...	...	7	...	...	10	11
Draba incana	...	...	...	...	...	...	...	...	...	10	11
Viola lutea	1	...	...	4	...	6	7	...	9	10	11
Drosera anglica	...	...	...	...	...	...	7	8	...	...	...
Sagina subulata	...	2	3	...	...	...	...	...	...	...	...
Arenaria verna	...	2	...	...	...	...	7	...	9	10	11
Stellaria nemorum	1	...	3	4	...	6	...	8	9	10	11
Geranium sylvaticum	1	2	3	4	5	6	7	8	9	10	11
Potentilla fruticosa	...	...	...	...	...	...	...	...	...	...	11
alpestris	...	2	...	...	...	...	...	...	...	...	11
Rubus chamæmorus	1	...	...	4	...	6	7	...	9	10	11
saxatilis	1	...	3	...	5	6	7	8	9	10	11
Sanguisorba officinalis	...	...	...	...	5	6	7	8	9	10	11
Epilobium anagallidifolium	1	...	...	...	...	...	...	...	...	...	11
alsinifolium	1	...	...	...	...	...	...	...	...	10	11
Callitriche autumnalis	...	...	...	...	...	...	...	8	...	...	...
Ribes petræum	...	...	...	...	...	...	7	8	9	...	11
Sedum rhodiola	1	...	...	...	...	...	...	...	...	...	...
villosum	1	2	3	4	5	...	7	...	...	10	11
Saxifraga stellaris	1	...	3	4	...	...	7	...	9	10	11
aizoides	...	...	...	...	...	...	7	...	...	...	11
hirculus	...	...	...	...	...	...	...	...	...	10	...
hypnoides	1	...	...	...	...	...	...	...	...	...	11
Parnassia palustris	1	2	3	4	5	6	7	8	9	10	11
Cornus suecica	1	...	3	...	...	...	...	...	...	...	...
Ligusticum scoticum	...	2	...	...	...	...	...	...	...	...	...
Meum athamanticum	...	...	...	...	5	...	...	...	...	...	...
Myrrhis odorata	1	...	3	4	5	6	7	8	9	10	11
Linnæa borealis	...	...	...	...	5	...	...	...	...	...	...
Galium sylvestre	...	...	...	4	...	...	...	...	...	10	11
boreale	1	...	...	...	...	6	7	8	...	...	11
Crepis succisæfolia	1	2	3	4	5	6	7	...	...	10	11
paludosa	1	2	3	4	5	6	7	8	9	10	11
Hieracium anglicum	...	...	...	...	...	...	...	...	...	...	11
iricum	...	...	...	...	...	...	...	...	...	...	11
argenteum	1	...	...	4	...	...	...	...	...	...	...
pallidum	1	2	...	...	...	...	...	...	...	10	11
lasiophyllum	...	...	...	4	...	...	...	...	...	...	...
cæsium	...	2	...	4	...	...	...	...	...	...	11
gothicum	...	...	...	4	...	6	7	...	9	10	11
prenanthoides	1	...	...	4	...	6	7	...	...	...	...
crocatum	1	...	...	...	...	6	...	...	...	10	11
corymbosum	...	...	...	4	...	6	...	...	...	...	11
Carduus heterophyllus	1	2	3	4	5	6	7	8	9	10	11
Gnaphalium dioicum	1	2	3	4	5	6	7	8	9	10	11
Campanula latifolia	1	2	3	4	5	6	7	8	9	10	11
Andromeda polifolia	...	...	...	...	5	6	...	8	...	...	...
Arbutus uva-ursi	...	...	...	...	...	...	7	8	...	...	11
Vaccinium vitis-idæa	1	2	3	4	5	6	7	8	9	10	11
uliginosum	...	...	...	...	...	...	7	...	...	...	11
Pyrola media	...	2	3	...	5	...	...	8	9	10	...
minor	1	2	3	4	5	6	7	8	9	10	11
secunda	1	...	...	...	...	...	...	...	...	...	...

Gentiana verna	...	...	...	...	...	...	...	...	...	...	11
Polemonium cœruleum	...	...	...	4	...	...	...	...	...	...	...
Bartsia alpina	...	...	...	...	...	...	...	...	...	...	11
Melampyrum sylvaticum	...	...	...	...	...	...	...	...	...	...	11
Lamium intermedium	1	...	...	4	...	...	...	...	...	...	...
Merteusia maritima	1	...	...	...	...	...	...	...	...	...	...
Primula farinosa	...	...	...	...	5	...	7	8	9	10	11
Trientalis europæa	1	2	3	4	5	...	7	...	9	10	...
Polygonum viviparum	...	...	...	...	...	...	...	...	...	10	11
Rumex aquaticus	...	...	...	4	...	...	7	...	...	10	11
Empetrum nigrum	1	2	3	4	5	6	7	8	9	10	11
Salix pentandra	1	2	3	4	5	6	7	8	9	10	11
nigricans	1	...	...	4	...	6	7	8	9	10	11
laurina	1	...	...	...	5	...	...	...	9	...	...
phylicifolia	...	...	...	...	...	...	7	8	9	10	11
Listera cordata	1	2	3	4	5	...	7	8	9	...	11
Habenaria albida	...	...	...	...	5	6	7	...	9	...	11
Cypripedium calceolus	...	...	...	...	...	...	...	...	...	10	...
Allium scorodoprasum	...	...	...	...	...	...	...	8	...	10	11
Gagea lutea	...	2	3	...	5	6	7	...	...	10	11
Convallaria verticillata	...	...	...	...	...	...	7	...	...	...	...
Tofieldea palustris	...	...	...	...	...	...	...	...	...	...	11
Juncus triglumis	...	...	...	...	...	...	...	...	...	...	11
Blysmus rufus	...	2	3	...	...	...	...	...	...	10	...
Scirpus uniglumis	...	2	...	...	...	...	...	8	...	...	...
Elyna caricina	...	...	...	...	...	...	...	...	...	...	11
Carex dioica	1	2	3	4	5	6	7	8	9	10	11
pauciflora	...	...	...	...	...	6	...	...	...	...	...
rigida	1	...	...	...	...	...	...	...	...	...	11
capillaris	...	...	...	...	...	...	...	...	...	...	11
limosa	1	2	...	...	5	...	7	...	...	...	...
irrigua	...	...	...	...	...	...	7	...	...	...	...
filiformis	...	2	...	...	...	...	7	...	...	...	...
Sesleria cærulea	...	...	3	...	...	...	...	...	9	10	11
Melica nutans	...	...	...	...	...	6	7	...	...	10	11
Festuca sylvatica	...	...	...	...	...	...	...	...	...	10	...
Elymus arenarius	...	...	3	4	...	...	...	8	9	10	11
Woodsia ilvensis	...	...	...	...	...	...	...	...	...	...	11
Polypodium phegopteris	1	2	3	4	5	6	7	8	9	10	11
dryopteris	1	2	3	4	5	6	7	8	9	10	11
Allosorus crispus	1	...	3	...	5	6	7	...	...	10	11
Polystichum lonchitis	...	...	3	...	...	...	...	...	...	...	11
Asplenium septentrionale	...	2	...	...	...	...	...	...	...	...	...
germanicum	...	2	...	...	...	...	...	...	...	...	...
viride	1	...	...	...	...	...	7	...	...	10	11
Lycopodium alpinum	1	...	...	...	...	...	7	...	...	10	11
selago	1	2	3	4	5	6	7	8	9	10	11
selaginoides	1	2	3	4	5	...	7	8	9	10	11
Equisetum umbrosum	...	...	...	4	...	...	...	...	...	...	11
hyemale	...	...	3	4	5	...	...	8	9	10	...
variegatum	...	...	...	...	...	...	7	...	...	...	11
Total	48	34	34	40	35	34	51	36	38	54	74

The result which we obtain from this list is not the less interesting from being scarcely that which we should, *a priori*, have

expected. The greatest concentration of these boreal plants is, we see, in the most southern of the districts. The special richness of Teesdale in Montane species is a fact which we cannot undertake to explain; but if the relative abundance with which these plants occur in the different districts were to be taken into consideration, the contrast would be much more striking than it is now. The small proportion of the total number of species which any other district, except that of the Tees, yields is noteworthy, especially the lowness of the figure for district number one, which, besides being the most northern in position, contains the high Cheviot peaks, and a wide area of elevated ground. We may take the even distribution of a considerable number of these plants through the districts as indicating (what is a characteristic feature of the physical geography of the two counties) the large extent of surface which is occupied by low hilly country, a circumstance which explains also a point upon which we shall afterwards have occasion to dwell, and the large number of plants common in the south and centre of England that come to a stop in their wanderings towards the north within our bounds. So much premised by way of introduction, we will now take the districts seriatim.

1. TWEED AND TILL DISTRICT.

The Tweed altogether drains an area of 1870 square miles, including nearly the whole of Roxburghshire, Berwickshire, Peeblesshire, and Selkirkshire, and portions of Haddingtonshire, Edinburghshire, Lanarkshire, and Northumberland. At the town of Peebles, 50 miles from the coast in a direct line, it is only 500 feet above sea-level in altitude. For about 18 miles in a direct line the main branch forms the northern boundary of Northumberland, a broad sinuous stream, flowing more rapidly than is usual with rivers of so large a size, past Carham, Cornhill, Tillmouth, Twizell, and the ruined castle of Norham to Berwick. The banks are in some places level and grassy, but sometimes steep and wooded. The influence of the tide reaches up to Norham, which is 10 miles inland. There is a small burn

at Learmouth, and a swamp in the level country, which yields *Lastrea thelypteris*, *Cladium mariscus*, *Cicuta virosa*, and *Carex limosa*. Along the whole course of the main stream, on the southern side, the elevation is under 300 feet, and the country well-cultivated and fertile. The Till in its lower part is about midway between the sea and the western border, and nearly parallel with both, a sluggish stream of considerable size, winding lazily amongst the meadows and corn-fields, overhung by willows and alders, with neighbouring swamps full of *Equisetum limosum*, *Sparganium*, *Iris*, and *Carex vesicaria*. This is the character of the stream for nearly 20 miles. From this cultivated flat on the west the Cheviot mass rises up abruptly, and on the east the sandstone range rises up, also with considerable abruptness, to shelter it from the sea breezes, moor-like above and the flank wooded past Eglingham, Bewick, and Chillingham, but becoming lower and greener at Doddington and Lowick, and, still further northward, becoming gradually almost lost in the level country as it nears the Tweed. Titlington Pike, the highest point of this range above Eglingham, is 765 feet in elevation; Ross Castle, the highest peak of the whole range, a heather-clad height above the pleasant park of Chillingham, which stands out conspicuously in all the Cheviot views, is 1036 feet. Black Heddon, a few miles further north, is 646 feet; but the stream from the west side of this runs down into the sea direct, not into the Till. The village of Lowick, which is just upon the watershed midway between Wooler and Berwick, is not more than 400 feet in elevation. The multiplicity of names for the streams in this region puzzles a stranger. The Bremish is only another name for the main Till stream before it emerges from the hills. This main branch rises in the very heart of the Cheviot mass, close upon the county boundary. The upper part is shut in between two huge masses of hill, Cheviot itself rising to a height of 2676 feet upon the north, and Weather Cairn and Cushat Law on the south to 1836 feet and 2019 feet. From the hanging stone at the south-east corner of Cheviot, a spur of high hill runs nearly 10 miles due east parallel with the Breamish over Hartside and Reveley. The principal farm-houses of the upper

part of the stream are called Bleakhope and Shillmoor. Due south of the peak of Hedgehope, on a little side-stream from this northern ridge, is Linhope Spout, the finest waterfall of the district. High up on the bare hill-side, 500 feet above Reveley, the waters of this little burn fall over a brown porphyritic crag 50 feet in depth into a deep basin, and as the directories tell us, "the cataract is sometimes called the Roughton Linn, from the great noise made by the fall of the water when the stream is full." Where the road from Branton to Wooler crosses it, this northern spur is only 550 feet in elevation. A lower ridge of hill than that of which we have been speaking runs between the Breamish and the head of the Aln. The peaks between Alnham and Ingram are Cochrane Pike (1096 feet) and the Grey Yade of Coppal (900 feet); and the highest point of the road west of Glanton is 500 feet. At Branton, where this main stream enters the flat cultivated country, the character of these Cheviot rivulets, in their short stage of transition from hill-burns to low-country streams, is well shown. They spread out into broad shallow channels, with beds full of pebbles and rounded boulders of porphyritic rock, with wild roses, broom, furze, and bushes of *Salix purpurea* scattered over the flat and dry-loving plants amongst their sandy borders, *Galium verum*, lotus, harebell, *Anthyllis*, *Reseda luteola*, and *Malva moschata*, and in the thin bare places *Trifolium arvense*, *Filago minima*, and *Aira caryophyllea*. Opposite Eglingham the distance from the hill-spur on the north to that on the south is not more than 2 miles. South of the Reveley ridge, on the east slope of Hedgehope, is a depression in the Cheviot mass, down which two small streams, Roddam burn and Lilburn, run down to join the Till, the former with a pleasant wooded dene. From the sandstone ridge there are no streams of any consequence entering the Till south of Chatton, where it turns more to the west, till it receives the branch which is called sometimes the Caldgate Burn and sometimes the Wooler Water. The town of Wooler is situated on the very outskirts of the Cheviot mass on a rather steep slope, the main street being about 300 feet above sea-level and the bridge 50 feet lower. The highest mass of hill, to which the

name of Cheviot especially belongs, is most easily reached from the town by following the high-road up the Wooler Water to Langlee-ford, by way of Earl, a distance of 5 miles. The high ridge is about a mile long, the western end, round what is called the Dunsdale Cairn, a peaty swamp, the slightly higher eastern cairn drier. The Wooler Water rises on the back of this ridge in a depression which runs south of the ridge over into Henhole. Two miles above Langlee-ford there is a small waterfall called Hartside Linn, above which the ravine is bare and monotonous. The highest points of Cheviot and Hedgehope are not more than 2 miles apart, and the steepness of the ravine which separates them may be best understood from the fact that the Langlee-ford farm-house, which is nearly in a direct line between the two peaks, is 1600 feet in level below the one, and nearly 1900 feet below the other. But there is very little crag upon the sides of this ravine, and very soon after leaving the house in climbing upwards we pass out into open moory ground, leaving all trees and enclosures behind. We could only see thirty-five plants upon the hill at an elevation of upwards of 2000 feet, and of these we have already given a list. The Langlee-ford farm-house is 400 feet above Wooler, 750 feet above sea-level. For 3 miles below it the stream runs down a fine ravine, from which the hills rise sharply to a height of from 1500 feet to 1000 feet above it on both sides, the lower part of their sides being somewhat wooded, the trees being principally birch, oak, rowan, and hawthorn, and the flat one continuous alder-grove. Over the ridge on the east of the stream the level declines directly towards Roddam and Ilderton. The hill just above Langlee-ford is crowned by a craggy crest (Langlee Crags), and the flanks of this lower part of the ravine are frequently covered with loose rocks. These faces of hill, or rather the heaps of loose porphyritic boulders that cover them, are characteristic of the district. From the south-west side of this glen it is several miles across to the series of rounded bell-shaped "tors" that form the southern flank of the range above Yevering and Akeld, and the intervening space is filled up by a heathery plateau, which is considerably lower in level than the tors which girdle it. Right through

the heart of this plateau, from west to east, to join the Wooler Water a little above Earl, flows a stream which is called the Common Burn, with a fork on the north called Broadstruther Burn. Both are bare moorland rivulets till they unite, after which the banks are wooded, and there is a narrow craggy ravine with a waterfall at the bottom, about which grow *Hieracium prenanthoides* and *Crepis succisæfolia*. But the most interesting glens of the Cheviot, whether for the botanist or lover of scenery, are those which penetrate the great ridge on the north, and contain the sykes which unite to form the College Burn. Within less than a mile from the cairn these decline in level 1600 feet, steep, bare, treeless ravines, their rivulets fed from innumerable bright-green well-heads, where copious fountains gush clear and cool out of the hill-side, flanked by embankments of loose stones or precipitous columns of red or grey porphyritic crag, the stream at the bottom leaping from terrace to terrace down a channel so steep that it is almost one continuous waterfall in the rainy season. To reach these from Wooler the best way is not to take the Earl road at all, but that which leads out of the head of the town on the west, and follow a footpath across the central heathery plateau, the portion of which nearest the town is called Wooler Common, crossing the Common Burn where the two branches join, and following the Broadstruther Fork out to its head. There is a horse-track all the way, that leads into the hollow of the College Burn, which is an open grassy depression of no particular interest, except that just above its very head, in the direction of the highest Cheviot cairn, is the station for *Cornus suecica*. The highest farm-house on the College is called Goldscleugh, and is a little over 1000 feet in altitude. There is a small ravine above it, but the three principal ones are further west. From the next farm-house, about half a mile lower down, we can look right up two of the rocky ravines, one of which, called Dunsdale, originates in the east, and the other, called the Brizzle or Bizzle, on the west of the western Cheviot cairn. On the flank of this ridge, from 1200 feet down to the stream, we have one of the few relics of the primeval forest of Cheviot, consisting here almost altogether

of birch. To reach Henhole, which is perhaps the finest, or at any rate the rockiest glen of the three, from Dunsdale, the ridge on the west has to be crossed, as the glen sweeps round the west end of the highest ridge so as almost to join the Langlee glen at its head. Of the well-heads of the upper part of these ravines, from 1500 to 1800 feet, the following are the principal plants:—

Caltha palustris.
Sedum villosum.
Saxifraga stellaris.
Epilobium obscurum.
alsinifolium.
Myosotis repens.
Montia fontana.
Stellaria uliginosa.
Parnassia palustris.
Lychnis flos-cuculi.
Taraxacum palustre.
Carduus palustris.
Galium palustre.
Juncus effusus.
lamprocarpus.
Carex pulicaris.
panicea.
vulgaris.

Amongst the debris there is abundance of *Allosorus crispus*, but the only other rare fern, *Asplenium viride*, is more difficult to find. The more note-worthy montane plants of the crags are—*Sedum rhodiola*, *Hieracium argenteum* and *pallidum*, *Rubus saxatilis*, *Poa Balfourii*, *Saxifraga hypnoides*, and *Epilobium angustifolium*. The streams of these ravines join at Southernknow, 3 miles below which is the finest of the low-level Cheviot waterfalls, Heathpool Linn. On the south is a dry bell-shaped hill, 1700 feet in altitude, and on the north a porphyritic crag sweeps down suddenly into the stream, contracting it for a space of 30 or 40 yards into a narrow rocky channel. The rocky banks are overgrown by bright-green shade-loving mosses, and overshadowed by ash and elm; and a natural wood of oak, rowan, and birch extends along the slope of the southern hill. Here grow *Dianthus deltoides*, *Euonymus europæus*, *Poa nemoralis*, *Epilobium angustifolium*, *Hieracium argenteum* and *crocatum*. At Kirk-Newton the Glen is joined by the Beaumont, which rises on the Scotch side of the Cheviot mass, and sweeps round it in a curve past Yetholm and Mindrum. The Kilham Hills, which are enclosed in the angle between the two streams, are a series of rounded tors not exceeding 1000 feet in height, dry,

and not interesting botanically. From Heathpool to Wooler, some 5 miles, the north flank of the Cheviot mass is guarded by the series of bell-shaped hills to which we have previously referred. In order, from west to east, they are called Newton West Tor (1762 feet), Newton East Tor, Yevering Bell (1182 feet), Akeld Hill, and Humbledon Heugh (977 feet). At their base the country is almost a dead flat, so that they are conspicuous from a great distance and command an extensive view, north-eastward to St. Abb's Head and the Berwickshire hills, northward to the Lammermuirs, westward up the Tweed Valley, past the Eildons, to the loftier hills round the head of Ettrick, Liddesdale, and Teviotdale. The Caldgate stream joins the Till within a mile of Wooler. At Doddington the latter receives a rivulet, called Hetton Burn, from the sandstone ridge on the west, upon which is a small waterfall. The Glen and Till unite at Ewart, and from this point, or further down, when the evening sun is sinking behind, is, we think, the finest view of the Cheviots. The mass rises up clearly defined from the level country, the rounded tors in front, and behind them the higher hills over Langlee-ford and Southernknow, and highest of all, the great ridge of Cheviot itself, and the slightly lower rounded summit of Hedgehope. Past castles and villages famous in history and border story, the Till flows with many windings northward. The last low swell, crested with fir trees, where the hill-country sinks into the plain, is Flodden Edge, and that rich corn-land at its base is Branxton Lea. The castles and parks of Twizell, Etal, and Ford pleasantly diversify the last 5 miles of the stream, which joins the Tweed 10 miles below Ewart.

This district measures about 20 miles long by from 10 to 15 miles broad, and is about 250 square miles in area, of which the Cheviot mass occupies more than one-third.

ALTITUDES.

(Those marked with a star are communicated by Sir Henry James, Director-General of the Ordnance Survey, the others

generally measured from these as a basis by the Aneroid barometer.)

	FEET.		FEET.
Cheviot	2676*	Breamish at Branton	350
Cairn Hill	2545*	West Newton Bridge	220*
Hedgehope	2346	Roddam	510
Langlee Crags	1390*	Glanton Hill	534
Langlee Farm-house	750	Cushat Law	2019
Heathpool Linn Head	350	Weather Cairn	1836*
Dunsdale Farm-house	950	Bench mark ten chains west of Coupland Castle	165*
Goldscleugh	1020	Ross Castle	1036*
Wooler Bridge	250		

2. NORTH-EASTERN DISTRICT.

This is a long narrow tract extending 30 miles along the coast, from the Tweed nearly to the Aln, through which flow several small streams from west to east. From the plain of the Till on the west, it is separated by the range of sandstone and basaltic moor, which has been mentioned already. Ross Castle, the highest point of the range (see above), is at the point where districts one, two, and three meet. For some distance northward the ridge is often 3 or 4 miles broad, with a decided slope on both sides, and is but little planted or cultivated. For 8 miles it maintains this character of heathery moor, the most interesting plants being *Myrica gale*, *Listera cordata* and *Trientalis europæa*, all of which occur in considerable plenty. Black Heddon, north of Belford, is a conspicuous heathery ridge, between 600 and 700 feet in altitude, with a base of arenaceous crag. On the north-east, parallel with Black Heddon, but extending beyond it in a northern direction, are Kyloe Crags, the finest range of basaltic cliffs in the northern part of the county. This ridge is a mile in length and slopes towards the sea, which is not more than 2 miles distant. The direction is from north-west to south-east, and the highest point a little under 600 feet. The seaward slope is gradual and grassy, but the opposite face is precipitous, the actual cliff being not more than 20 feet or 30 feet in depth; but the bank beneath it, about 50 feet in all, is steep and thickly covered with basaltic debris. A list of the plants of this crag

has been already given. The sandstone sweeps down from Black Heddon to underlie the basalt, and on the north never recovers its altitude. For several miles northward the ridge is only about 400 feet in altitude, and beyond Lowick it is even lower, but still, in many places, only partially cultivated. From Berwick southward to Belford the coast is low and sandy. There are three principal streams, but the low cultivated country between the ridge and the sea is only from 2 to 4 miles broad. The northern part of Holy Island is a sweep of low waste sand-hill, but on the south, about the castle and the village, the basalt appears. Along the low stretch of sandy shore opposite Holy Island, from Ross Point past Fenham to Beal, is one of the best stations along the coast for maritime plants. Above Easington and Belford small patches of basaltic crag again appear. Next comes a longer stream called the Warn Burn, which flows down a wooded hollow past Twizell House to the sea. On the east of this the basaltic crags stretch with interruptions from Spindlestone to the coast at Bambro'. This part of the ridge yields several interesting plants, amongst which are *Spiræa filipendula*, *Hieracium pallidum*, *Vicia lathyroides*, *Allium schœnoprasum*, *Mœnchia erecta*, *Potentilla alpestris*, *Sedum villosum*, and *Arenaria verna*. The last three are plants of such well-marked montane character that their occurrence here is worthy of attention, as the ridge is under 150 yards in altitude, and quite isolated from any of the higher hills, and the Arenaria does not occur anywhere else in Cheviot-land. The basalt comes out in full force along the shore from Bambro' southward. The Farne Islands are all basaltic outliers, and past Beadnell, Swinhoe, and Embleton to Cullernose, near the Howick grounds, are several fine faces of crag, with low sandy depressions between them. The area of this district is about 150 square miles.

ALTITUDES.

	FEET.		FEET.
Ross Castle	1036*	Belford	209
Black Heddon	640	Lowick	400
Kyloe Crags	570		

3. ALN DISTRICT.*

The main branch of the Aln has its sources on the eastern slope of the Cheviot range near to Alnham, where the junction of a few sikes, or mountain streamlets, forms the Ale-water. The highest hills at the head of the vale of the Aln are the Grey Yade of Coppall (900 feet), and Cochrane Pike (1096 feet), which, like the other Cheviot hills, are bare and grassy, with here and there an outbreak of porphyritic rock. The general course of the river is from west to east, and its length about 24 miles. The upper portion flows in a pretty wide valley, between the porphyritic hills on the north and the great sandstone ridge on the south and south-east. It skirts the base of this ridge for 11 miles till it reaches Brislaw, where it cuts through the ridge which, at the Beacon Hill on Alnwick Moor, attains 808 feet; and after crossing Hulme Park, which extends about 3 miles, and, passing by Hulme and Alnwick Abbeys and Alnwick Castle, it winds its way south-eastward and falls into the sea at Alnmouth.

The drainage area of the upper portion is from 3 to 11 miles wide, the principal affluents on the south being the Coo and Edlingham Burns, which are more than 5 miles in length, and drain the moorlands of the sandstone ridge about Coo Crag (1004 feet), and of Rimside (816 feet), where there is a station for *Cornus suecica*. The ridge is here several miles broad, heathery, and in many places boggy, and extends southward without interruption to the Coquet. On its eastern slope Rugley Burn has its source in Alnwick Moor and in Rugley Old Dene; by the side of this burn grow *Carduus heterophyllus*, *Crepis succisæfolia*, and *Gagea lutea*. On the north of the Aln two branch-streams, Eglingham and Shipley Burns, which have a course of about 6 miles, and unite and join the Aln near Shipley, have their sources in the Chillingham and Charlton Moors, which have an elevation of from 600 to 1000 feet. At the base of the Eglingham hills is Kimmer Lough, now about 9 acres in extent, but formerly much larger.

* By Mr. Tate.

The lower part of the vale of the Aln is not more than from 2 to 4 miles wide. The most interesting botanical station near Alnwick is Ratcheugh Crag, another portion of the basaltic dike which from this point runs across the county in a south-western direction. Here occur *Sesleria cærulea*, *Astragalus glycyphyllos* and *hypoglottis*, *Geranium sanguineum*, *Dianthus deltoides*, *Mænchia erecta*, and several other interesting species. The area of this district is about 150 square miles. None of the hills, except those west of Alnham, rise distinctly into the Middle zone.

ALTITUDES.

	FEET.		FEET.
Cochrane Pike, Prendwick	1096*	Whittingham Church.....	247*
Grey Yade of Coppal, Alnham	900*	Alnwick Bridge	105*
Coo Crags, Whittingham	1004*	Junction of four roads, Alnham	463*
Alnwick Moor.....	808	Heiferlaw Tower.....	451
Rimside Moor	816	Shilbottle Moor	473

4. COQUET DISTRICT.

The course of the Coquet is nearly in a line from west to east, and its length about 40 miles. For several miles its watershed ridge on the north forms the boundary between England and Scotland. The upper part of the dale has entirely the characteristic Cheviot aspect—a narrow grassy hollow, with a stony unenclosed moorland road, at the bottom a brawling mountain streamlet, excellent for trout-fishing, grassy hills rising steeply from this on either bank, very little actual crag, and what there is usually down by the stream-side, but often great sweeps of porphyritic debris stretching down the banks, flecked with green of brake and purple of foxglove. At the corner, between the Usway Burn and the Breamish, Windygyle is quite 2000 feet in altitude, and between the Alwine and Hedgehope, Cushat Law and Weather Cairn reach 2019 and 1836 feet. From this point the ridge westward along the Scotch border, though further up the river is not so high. Between the two forks of the Coquet, where Watling Street crosses the border, Chew Green Camps are

1436 feet in altitude. From this point down to Alwinton the distance is 14 miles. The most interesting point of the river is at Linn Shiels, 2 miles west of Alwinton. Here, on the east, a precipice of porphyritic crag rises from the stream to a height of 100 feet above it. The opposite bank is also steep and craggy, and a horse-shoe shaped ravine is formed, at the bottom of which the stream, pent within a narrow channel of rock, flows in a succession of leaps and dark peaty pools. This is the point at which, proceeding downwards, the sedimentary strata are first reached in the bed of the river; and below the ravine the Tuedian flagstones may be seen clearly dipping towards the south-east at a steep angle of inclination. The Ridlees Burn, which joins the Coquet just below, is almost coincident along its whole course with the line where the porphyry ceases. At Windy-haugh, 6 miles from its source, the Coquet is only 830 feet above sea-level, and at Alwinton, 8 miles lower down, it has sunk to 500 feet. In the corner between the Alwine and the Coquet, the hills rise to a height of about 1000 feet. The upper part of the Alwine has the same character as that of the Coquet, so that this drainage tract contains almost as much porphyritic hill and dale country as the first district, a tract of about 70 square miles in area, stretching from Alwinton away to the north and west, steep ridges and high rounded knolls with bare grassy banks, diversified but rarely by those same sweeps of grey or brick-red porphyritic rock of which we have already spoken, a monotonous and very lonely region, that seems to be given up almost entirely to the sheep. We have given already a list of the plants of one of the Alwinton cliffs, and must now take a final leave of the porphyritic region. Between Alwinton and Rothbury, on the north side of the river, the ground, stretching away from the Coquet towards the head of the Aln, is flat and cultivated, hardly anywhere exceeding 500 feet above sea-level. The lowness of this tract, when the stream lower down on the same side is bordered by high heathery moorland, seems anomalous to one accustomed to the gradually rising banks of hill that usually margin the streams that flow from the Pennine chain on the east. On the south side of the Coquet the physical

geography is more like what is usual. From Ridlees Cairn (1346 feet) to Simonside (1447 feet), a distance of 15 miles, stretches a bank of hill of an altogether different character from those we have left behind on the west, heathery and plateau-like, forming at first the watershed between the Coquet and the Reed, and afterwards between the Coquet and upper part of the Wansbeck. Harbottle Lough, a lonely little tarn in the heart of hill a mile south-west of the village of Harbottle, with flocks of screaming sea-gulls wheeling about it in summer-time, and swamps of *Comarum*, *Menyanthes*, *Equisetum limosum*, and cotton-grass, and sweeps of heathery moor fragrant with gale and juniper, stretching far away towards Redesdale on the south, and ridges of grey gritstone crag shutting it in on every side, is well worthy of a visit. The edge of moor at this point is barely 1000 feet above sea-level, and the gradual slopes about Harbottle and Holystone are covered with fir-plantations, and in one place a natural wood of oak and birch stretches down to the road-side. At Holystone, close to the village, is the well of Paulinus, a small spring of water, crystal-clear, one of the places where the indefatigable missionary baptised an indefinite number of converts, as a statue and inscription commemorate. All along this part the north side of the river has nothing of the mountain aspect; but above Rothbury, where the stream has sunk to under 100 yards above the sea-level, we strike the sandstone ridge in its northward course transversely, the hills again attaining a height of 1000 feet, and rising above the town with considerable steepness, crested with edges of gritstone crag. A streamlet which flows down from this hill is called Hebden Burn. Simonside is a characteristic feature of Northumbrian physical geography, a great mass of hill rising up in the very centre of the county to a height of 1500 feet, and commanding nearly the whole of it at a single view. From the loosely-piled cairn of stones that marks the highest point the eye stretches on the north to the Cheviot ridge, Cheviot and Hedgehope standing out like two camel-shaped humps prominently in front, to the west a slightly lower continuous ridge sweeping away to bound the view for a quarter of a circle, and on the east a spur prolonged from them in the direction of the

head of the Aln. The foreground in front of this wall-like ridge consists of a broad space of comparatively low cultivated country, of which Alwinton, Alnham, and Rothbury are the limits, brown fallows, bright-green fields of grain, duller green pastures and meadows, very little wood, and what there is not in patches but principally scattered trees in the hedgerows and along the streams, the Coquet winding along the dale, sometimes hidden, sometimes gleaming in the sunshine. To the east rises the heathery moor which runs without a break from Rothbury northward to the Aln, scattered over with edges of grey gritstone rock. The western hill shuts out the view of the Harbottle fir-woods and upper part of the Coquet valley, but on the right the long line of coast from the Aln to the Tyne can be clearly seen; and due south a wide tract of low undulated moory country across the Wansbeck and Tyne to Kilhope Law and the Durham fells, and further west the similar valleys of the Reed and North Tyne, with the Lake hills far away over them on the distant horizon. Eastward of Rothbury the watershed ridge on both sides of the valley declines rapidly, and soon assumes the character of low cultivated country. On the south it is 600 feet in altitude above Long Horsley, and on the north 473 feet at Shillmoor. Past Brinkburn Priory, Felton village, Acklington Park, and the castle and priory of Warkworth, margined often, like its neighbour-streams the Aln and Wansbeck, with steep wooded banks, the Coquet flows with many windings to its mouth at Warkworth Harbour. The total area of the district is about 250 square miles.

ALTITUDES.

	FEET.		FEET.
Chew Green Camps, Coquet Head	1436*	Alwinton Church	505*
Cushat Law	2019*	Road three-quarters of a mile east of Sharperton	528*
Weather Cairn	1836*	Ridlees Cairn	1346*
Cold Law, over Biddlestone	1287*	Harden Hill	1038*
Point near Biddlestone Edge Farm-house	800*	Harbottle Lough	850
		Moor south of ditto	940
		Holywell, Holystone	430

	FEET.		FEET.
Great Midding Hill, Edlingham	882*	Junction of Roads half a mile south of Netherton	683*
Tosson Hill, Simonside	1447*	Rothbury Church	279*
Ravensheugh Crags	839*	Felton Bridge	93*
Rufflaw, Long Horsley	597	Forest Burn Toll-bar	493*

5. WANSBECK DISTRICT.

The numerous east-flowing streams which join to form the Wansbeck come from a tract which, from Simonside towards the Tyne, stretches for 10 or 12 miles through the heart of the county, a tract of very thinly-inhabited low grassy moorish country, the ridges running west and east, not more than from 600 to 800 feet in elevation, with very little crag upon them, but often covered with plantations of Scotch fir, spruce, and larch, and the hollows in various stages of transition between pasture and grassy moor. The northern fork rises in Bodle Moss, on the southern slope of Simonside, and joins a streamlet from Darden Rig to form the Font. Amongst the swamps of the upper part of this branch the *Andromeda* grows; and Chartner's Lough, a little mountain tarn near the head of the northern fork, is the station for *Nuphar intermedium*. This drains the country between Long Horsley and Elsdon, and is the most wooded fork of the river, flowing from the moors south-eastward past Nunnykirk, Netherwitton, Pigdon Woods, and Newton Park, to join the main stream at Mitford. The next fork comes from the east slope of the Ottercaps and the moors round Catcherside and Harwood. It is a small fir plantation just north of the railway, near the head of one of the branches of this fork, that yields the *Linnæa*. Rothley Lake is a tarn amplified by artificial means at the head of another branch, and lower down are Rothley Castle and Hartburn Grange. The main branch begins 2 miles eastward of Reedsmouth and flows through Sweethope Lough, a moorland tarn said to cover 180 acres, with swamps round it of *Typha*, *Carex ampullacea*, and *Sparganium ramosum*, to Kirkwhelpington, south of which the basalt crops out prominently in Thockrington and Bavington Crags, the only

places where it is conspicuous between Gunnerton and Alnwick. At Wallington the stream is a mere brook, some 6 or 8 yards across, between grassy pastures, with the fine old hall and its rich woods looking down upon it from an easy slope on the north. About Meldon and Mitford the banks are deep and pleasantly wooded. Below this latter village there is a steep bank planted with beech and sycamore for at least a mile on the north side of the stream, and the bed is in some places filled with rock and overhung with alder, bird-cherry, and willows, amongst which grow *Trollius*, *Myrrhis*, *Crepis paludosa*, and *Cardamine amara*. The town of Morpeth is situated in a hollow but little above the level of the stream 5 miles from its mouth, with wooded banks rising rather abruptly to a height of about 100 feet to enclose it. It is a pleasant ride in summer-time from Morpeth by the coach to Long Horsley, up a gradual ascent through a thinly-populated and thinly-cultivated country where brake, furze, and broom still linger in the lanes, and honeysuckle and wild roses cluster in the hedges, till at last the brow of the bank is gained, and Simonside and the Cheviots leap up suddenly into view. The stream is large enough to admit small vessels as high as Morpeth, and flows between deep wooded banks below Bothal Castle into an estuary at Camboise. The area of the district is about 200 square miles.

ALTITUDES.

	FEET.		FEET.
Simonside	1447*	Morpeth Bridge	94*
Cockhill	367*	Point quarter of a mile north of Hebron Village	376*
Rufflaw	597		
Meldon Bridge	243*		

6. NORTH TYNE DISTRICT.

This district has an area of about 400 square miles, embracing a tract 20 miles across in both directions, including the western border of the county from the Cheviots southward for half the distance to the Durham border, a large proportion of its surface being uncultivated grassy or heath-clad moor between 500 and

1000 feet in elevation. For 25 miles the watershed ridge of the two branches of the North Tyne forms the boundary between Northumberland and Roxburghshire. For 15 miles from north-west to south-east the two dales, Redesdale and North Tynedale, run parallel with one another, broad grassy dales with villages and farm-houses thinly scattered at the bottom or along the banks and winding streams with numerous branches that lead up gradually into the recesses of the moors. Between the Reed-water and upper part of the Coquet there is a broad continuous ridge of heathery grit-crested moor, of which the highest point, Ridlees Cairn, attains 1346 feet. Carter Fell, on the south of the road on the Scotch border, at the very head of the Reed overlooking Liddesdale, attains 1600 feet. Near the head of the Chattlehope Burn, the first stream of any consequence that falls into the Reedwater in the west is a fine waterfall amongst the moors called Chattlehope Spout. The upper part of this dale is very thinly populated, and seldom visited; but during the last two hundred years the hand of agricultural improvement has been steadily at work, and the wide morasses and neglected heaths of the days of the moss-troopers have been many of them drained and turned into sheep-walks, and here, as further north, of the natural forests of the glens, the primeval woods of birch, alder, oak, rowan, and willow, but few relics remain. At Rochester, 10 miles south-east of Carter Fell, are marks of Roman occupation. A few miles lower down is Otterburn, the scene of the skirmish between the Percies and Douglasses, which the ballad of Chevy Chase commemorates, and then comes Elsdon, the principal village of the dale. Here Redesdale may be considered to end. On each side a conspicuous hill, under 1000 feet in height, rises up to guard the entrance, that on the west called Hareshaw Moor, and that on the east the Ottercaps; and the stream turns suddenly to the south-west, flowing 6 miles in that direction before it joins the North Tyne at Reedsmouth.

The North Tyne rises in a broad hollow on the western edge of the county, being formed by the union of several streams which flow from a crescent of heathery gritstone hills extending from Carter Fell, Carlingtooth Fell, Peel Fell, and Deadwater Fell,

southward to the head of the Cairncleugh Burn, the first-mentioned peak 1600 feet, but the others only from 1000 feet to 1300 feet in altitude. In the 15 miles which it flows eastward before the Reedwater joins it, the ridge on the north has sunk to 800 feet. This is penetrated by one principal stream, the two branches of which are called the Tarret and Tarset. The Border Counties Railway now runs along the whole length of the dale and passes out at its head, forming one of the principal lines of communication between Newcastle and Edinburgh. Above Bellingham the population is thin, and the villages are very small. There are considerable plantations about Kielder Castle and Hesleyside, and workable collieries at Kielder and Falstone. In the neighbourhood of Smalesmouth is the station for *Convallaria verticillata*. On the south, between the North Tyne and Irthing, is a wide space of barren moor, crested in some places with edges of gritstone, which rises scarcely anywhere above 1000 feet, and on this side the ascent from the river is very gradual. At Bellingham the stream is from 30 to 40 yards across, and 375 feet above sea-level. Here it is joined by the Hareshaw Burn on the north, on which is Hareshaw Linn, the finest of the Northumbrian waterfalls. The waterfall is about a mile distant from the town. Just above the railway we have to climb over the shale heaps of the iron-works. Then the sides of the glen become steeper and we lose sight of the town and surrounding moors, and enter a winding ravine where uncertain wandering paths lead up and down amongst the trees and underwood. First the lower fall is reached, a perpendicular ledge of rock some 20 feet in height, over which the stream breaks in two places, the rocks continued on both sides a little distance down the glen. The principal fall is about half a mile further up, and is of a much more important character. On the left a precipice rises up without break to a height of nearly 100 feet, one sheer wall of massive rock, brown and cool towards the base, with green mosses in the crevices; higher up, where the sun sometimes catches it, bare brown and white, or yellow-stained with lichen, the summit clothed with ivy and bird-cherry, and waving branches of elm and rowan. The stream flows from an opening half-way down

between this cliff and its counterpart on the opposite side, forming, not a large waterfall, but one where nature has made the most of the volume of water she has had to work with, for the the cliff, contrary to the ordinary plan in the North of England cascades of small side-streams, projects at the base considerably more than at the ledge, so that the water falls down an irregular slope of hard gritstone rock, the jagged projections of which break it into foam and spray, and innumerable sparkling eddies. The tall slightly-overhanging side-cliffs of the glen converge crescent-wise towards the fall and shut in a cool ravine where such plants as woodruff, golden saxifrage, *Cardamine sylvatica*, and *Campanula latifolia* luxuriate, and where we may gather oak fern, beech fern, and *Trollius*, *Rubus saxatilis*, *Epilobium angustifolium*, and *Crepis succisæfolia*.

After the junction of the Reedwater and North Tyne the stream and dale run south and rather south-east for 14 miles. The ridges on each side are not more than 400 feet above the river, and for the northern half of the 14 miles especially there is but little of the dale character. The bank of the stream is often steep and pleasantly-wooded, and there are several villages of considerable size (Wark, Barrasford, Chollerton, Wall, Humshaugh), and halls and castles at Haughton, Chipchase, Simonburn, and Nunwick by the side of the river, or hidden amongst the trees. The most considerable woods of this lower part of North Tynedale are those of Countess Park, near Reedsmouth, and of Chipchase, Nunwick, Chesters, and Warden Hill. On the east side of the dale, above Barrasford, the basalt stands out prominently at the top of the bank, with a precipitous escarpment facing the north (Gunnerton Crags), south of which the bank of the dale is steeper and the ridge more hill-like. On the west Wark Burn rises on the edge of the county and flows for 10 miles eastward through the moors before it joins the main stream. The basalt shows itself upon its banks at Rose's Bower and forms a small waterfall, but the principal basaltic cliff on the west side of the river is further south, and does not belong to this drainage tract. One of the forks of the branch that joins the Tyne at Nunwick, comes from the lakes on the north side of the Roman

wall. These are situated in the very heart of the heathery treeless moor, at an elevation above sea-level of from 200 to 250 yards. Greenley Lough is about three-quarters of a mile long by a quarter broad, Little Cow Lough half a mile long, and Broomley Lough broader and shorter. At Teeket, at the head of a fine wooded dene which extends down to Simonburn, this same stream forms a waterfall, spreading out first for 30 or 40 yards over a channel of hard rock, overhung by ash and elm, with woodruff, sanicle, and oak-fern, and cool bright mosses, such as *Mnium hornum*, *Dicranum pellucidum*, and *Hypnum rivulare* in the crevices, and then leaping over a crag some 20 or 30 feet in height amongst tumbled boulders. In the dene below the fall grow *Rubus saxatilis*, *Agrimonia odorata*, *Carduus heterophyllus*, *Vicia sylvatica*, *Crepis succisæfolia*, and *Hieracium prenanthoides*, and soon the stream totally disappears from its rocky channel only to reappear more than a mile lower down. In the lower part of the dale we trace the influence of the drier rocks in the appearance or increased abundance of such plants as *Knautia*, *Scabiosa columbaria*, *Betony*, *Thymus*, *Galium mollugo*, *Silene inflata*, *Poterium sanguisorba*, *Agrimony*, *Campanula glomerata*, *Origanum vulgare*, *Arabis hirsuta*, and *Geranium lucidum*. Warden Hill, crested with fir-woods, rises to a height of 450 feet above Chollerford, standing out boldly into the angle between the North and South Tyne, and commanding an extensive view in every direction.

ALTITUDES.

	FEET.		FEET.
Carter Fell	1600	Tyne Bridge, Bellingham	375*
Ridlees Cairn	1346*	Wark Bridge	270*
Peel Fell	1290	Tecket Moor	575
Lumsden Hill	725*	Barrasford Inn	245
Whickhope Nick, on Hopehouse Moor	1239*	Gunnerton Crag	578
Muckle Samuel's Crags, Whitehill Moor	1108*	Road above Chipchase Castle	325
King's Horn, on Roughside Moor	1070*	Warden Hill	588*
Hareshaw Moor	780	Junction of North and South Tyne	99

7. SOUTH TYNE AND ALLEN DISTRICT.

This district occupies the south-western corner of the county, and contains a greater extent of moor that rises into the Middle zone than any of the others except the first. For 12 miles on the west the Irthing forms the county boundary, with small branches that penetrate the moors on the Northumbrian side. The gritstone edge (Muckle Samuel's Crags) of the watershed between its head and the North Tyne is 1108 feet in elevation, and Whitehill, rather lower down, is 943 feet. Above Wardrew it is a mere moorland stream, but there is a waterfall called Cromel Linn, and lower down to Gilsland the banks are wooded, yielding *Saxifraga aizoides*, *Equisetum variegatum*, *Galium boreale*, and other plants scarcely to be expected at an altitude of between 300 and 400 feet. The pass over which the railway crosses, between the South Tyne and Irthing valleys, is little over 400 feet in elevation, and is the lowest point of the Pennine watershed, which divides the streams of the west from those of the east coast between the Cheviots and the Trent. A moorish swamp called Baron House Bog borders the railway here, and yields *Lysimachia vulgaris*, *Ranunculus lingua*, *Carex limosa* and *filiformis*, and abundance of *Vaccinium uliginosum*. Here the Irthing leaves the county to fall into the Eden above Carlisle. The main branch of the South Tyne rises in Cumberland not far from the head of the Tees. At Alston it is 900 feet in elevation, and in the 12 miles that it flows due north it declines on the average 45 feet per mile. Between Knaresdale and Allendale is a ridge of high moor, which reaches 1645 feet on Whitfield Common, and 975 feet over Plainmeller, 2 miles south of the railway. Below the castle and park of Featherstone the Tipple Burn, a considerable stream from the moors on the north, breaks through the basaltic ridge and flowing past the ruined castles of Blenkinsop and Thirlwall, joins the main stream, which turns suddenly due east and flows in that direction 50 miles before it falls into the sea. Between Haltwhistle and Hexham we have what is usually called South Tynedale, a hollow 15 miles in length, with the hills rising from it gradually on both sides. On the north the

most striking feature is the basaltic dike, which in some places reaches a height of 700 or 800 feet above sea-level, forming a decided ridge across the moor from west to east, with an escarpment towards the north which, in several places, consists of a cliff 20 or 30 feet in depth, as at Kyloe, with great heaps of angular slate-coloured basaltic debris scattered over the embankment below it. For several miles along the top of this ridge, with nothing on either side but heathery moor, the Roman wall is carried, following the irregularities of the ridge with pertinacious adherence. Rising from the Black Burn west of Featherstone Castle, where the water, after running for some distance in a deep and narrow channel is thrown over a columnar cliff in a succession of falls, from which the broken sedimentary rocks dip at every angle, and from the wild ravines called the Nine Nicks of Thirlwell, between the Tipple and Haltwhistle Burns, the ridge forms Wall Town Crags and Cockmount, and thence sweeps with a slight tendency towards the north by way of Sewing Shields, Black Bank, and Crag Lough, in the direction of Wall and Gunnerton. Crag Lough is a tarn half a mile in length, with a fine cliff of the kind just alluded to rising up from the water's edge on the south side. Muckle Moss is a large swamp upon the hill slope 2 miles to the south-east, which is well-known as a botanical station. By means of the Newcastle and Carlisle Railway this tract is all brought within the compass of a day's excursion from Newcastle. Round the head of the two branches of the Allen for 10 miles a continuous ridge of high heathery fell forms the watershed between Tyne, Wear, and Derwent. The highest points are near the centre—Kilhope Law, 2206 feet, and Stangend Rigg, 2074 feet; but for the whole 10 miles the ridge scarcely sinks below 1700 feet, and the spurs in a northern direction maintain a sufficient height for several miles to give East and West Allendale more of a decided dale character than any other of the Northumbrian valleys. This is well known as a rich mining tract. The limestone is thrown down to the level of the river in the western, and below the level in the eastern hollow in the upper part, so that the higher reaches of the main streams have very little to diversify them, and the hills are

undulated sweeps of the ordinary kind of heathery gritstone fell. We have given already a list of the plants noted in the Upper zone on Kilhope Law. As tested either by number of species or individuals the boreal element of the Flora is considerably smaller than in Weardale, and still more so than in Teesdale. The principal interest of the district, from a botanical point of view, arises from the extent and perseverance with which agricultural and horticultural cultivation has been carried on at, for Britain, an unprecedentedly high altitude; but as full details have been given in the chapter on climate, both as to species and the heights to which they are grown, we need not say more about the subject here. At the head of West Allendale there is a village of perhaps thirty houses, called Coal Cleugh, at a height of from 1600 to 1700 feet* above sea-level. Above Allenheads the slopes are everywhere clothed with extensive plantations of Scotch fir and other Coniferæ, and at the bottom of the hollow stands Mr. Beaumont's hall in the midst of its well-ordered grounds, and in front down the river extends a village half a mile in length, with a church and school-house, and a large number of cottages and gardens, and in the centre the mining office and entrance to the great shaft, a model mining village for order and cleanliness, at a height above sea-level of from 1350 to 1450 feet. The town of Allenton is 9 miles below Allenheads, near the point where the East and West Allen unite. From Whitfield all the way down to the Tyne the banks of the Allen are bordered with woods, and in some places, as for instance about the old castle or Peel of Staward, which stands out towards the river on a rounded rocky promontory, with a steep wooded bank on the opposite side and a high heathery moor in the back ground, they rise for 100 feet above it with much abruptness. At Gatton the watershed between the Allen and the stream on the east has sunk to 1000 feet, but there is still a well-marked ridge in the direction of Hexham with a gradual slope of cultivated country towards

* We may remark in passing, that an idea which we found generally diffused, even amongst educated people, that the little inn at the top of Kirkstone Pass is the highest inhabited house in England, is quite incorrect. The height of this is 1473 feet, and there are dozens of houses higher through the east side of the North of England.

Langlee Castle and Haydon Bridge. The area of the district is about 250 square miles.

ALTITUDES.

	FEET.		FEET.
Kilhope Law	2206*	Housesteads	730
Stangend Rigg	2074*	Juner Dodd on Thirlwall Common	742*
Allenheads Mining Office	1360*	Hummel Knowe on Henshaw Common	865*
Redburn Edge	1833*	Todd Crags, Houghton Common	1048*
Horseshoe Hill	1703*	Whitehill	943*
Sinderhope Turnpike	969*	Haydon Bridge Station	204*
Allentown Bridge	709*	Chesterholme	560
Whitfield Fell	1645*	Haltwhistle Church	365
Plainmeller Fell	975*	Ridley Hall	305
Whitfield Church	860		
Alston	913*		
Road east of Twice-brewed Ale	805*		

8. SOUTH-EAST DISTRICT.

This district includes an area of about 300 square miles, a large proportion of which belongs to the Coal country, and only a small portion at the south-western corner rises above the Lower zone. From the point where the North and South Tyne join and Hexham stands like an old Rhine city on a hill that rises from the south bank of the river, over-topped by the massive grey towers of its church and castle, the distance to the mouth of the river is 30 miles. At Hexham there is a bridge of twelve arches, and the stream is 100 feet above sea-level. The first stream on the south is called the Devil's Water and joins the Tyne at Corbridge. It has two long branches on the west called the Rowley Water and Dipton Burn, and the ridge in the direction of Allendale is distinctly marked, attaining 1200 feet towards the head of the stream and maintaining a height of 600 or 500 feet within a short distance of Hexham. From the last 6 miles, from the foot of Dukesfield Common past Woolley and Dilston, the main branch has its banks wooded almost continuously, and parallel with the Tyne, at a height of above 400 feet, a long

sweep of fir plantation stretches from Dilston eastward, and further back, between Slealey and the Derwent, is a bank of heathery moor within 5 miles of the Tyne, which extends eastward as far as Shotley and Minster-acres House, with an elevation of from 900 to 1000 feet. The Derwent forms the boundary of the district for 15 miles on the south, but its upper branches on the Northumbrian side are very inconsiderable. At Allansford Bridge it is 400 feet in altitude, and at Shotley Bridge 50 feet lower. Two pleasant wooded denes stretch down from the moor to the Tyne at Riding Mills and Bywell. North of the Tyne there is a gradually-sloping bank, cultivated and in some places wooded, which attains 490 feet above Corbridge, 520 feet at Heddon, and 400 feet opposite Newcastle. The principal wooded denes of the north side of the river are Whittle Dene near Ovingham, Walbottle Dene near Newburn, Scotswood Dene above Scotswood, and Heaton Dene below Newcastle, none of them more than about 2 miles in length, and the latter especially, like the last 15 miles of the Tyne, with but little of the indigenous vegetation still lingering. The collieries are principally concentrated in the area between Newburn, Blyth, and Shields. There are two small streams between the Tyne and Wansbeck, which are called the Pont and Blyth, the former of which is connected with Prestwick Carr, a large morass in the low country 4 miles north of Newcastle, which was once a good botanical locality, but is now enclosed and almost destroyed by drainage. Except about Whitley and Tynemouth this part of the coast is low and sandy, but in some of the wooded denes of the interior several of the Montane plants are scattered.

ALTITUDES.

	FEET.		FEET.
Dukesfield Common	930	Heddon-on-the-Wall Church	524
Slealey Village	620	East of Aydon.....	490*
Shotley Church	942*	East of Horsley	410*
Minster-acres House	835*	Shotley Bridge	349*
Cramlington	263	Allansford Bridge	399*
Bywell	83		
Stamfordham	410		

9. DERWENT DISTRICT.

The Derwent takes its rise by two branches, both of which begin a short distance east of Allenheads. The northern one is called the Beldon Burn, the southern one the Knucton Burn. After a course of 5 miles each they join at Hunstanworth, and the river takes the name of Derwent, and, flowing in a north-eastern direction, forms for nearly 20 miles the boundary between the counties. The hills of the upper part consist of undulated heathery fells of the ordinary gritstone character. Redburn Edge, in a line with Stangend Rigg, at the head of the Knucton Burn, is 1833 feet in elevation, and a ridge of high moor extends from this several miles due east to Bolt's Law (1772 feet), and Stanhope Common (1712 feet). Between the two burns the ridge is called Knucton Fell, and attains 1561 feet. A small stream from Bolt's Law, called Bolt's Burn, joins the main one at Bay Bridge, below Hunstanworth: the Burnhope Burn, a larger one from the same direction, drains the hollow between Edmundbyres and Muggleswick; and a third, the Hysehope Burn, takes its rise in the fells 3 miles south of the former village, and, after being joined by the Horsley Hope Burn, falls into the Derwent a little lower down. In different parts of the higher moorlands are to be seen, *in situ*, the remains of ancient birch-forests, the stumps of the fallen trees appearing above the peat; whilst the trunks of peat-buried oaks, of considerable size, give evidence of an ancient sylvan vegetation much superior to any in existence now. The Fell Top limestone first shows itself in the bed of a tributary of the Burnhope Burn, and below Muggleswick the Great Limestone appears in the bed of the Derwent, which winds very much in this part of its course through a picturesque wooded country. Then the stream turns north and leaves the great mass of moorland behind. At Cold Rowley the watershed ridge has declined in level to 900 feet, the stream at Allansford Bridge being just 500 feet below the top of the moor. Still, for several miles further, the steeply-sloping bank, on the east side of the stream, studded over with coal-mines and iron-works, keeps up a height of from 800 to 700 feet. At Shotley

Bridge, where the line between the Millstone Grit and Coal Measures strikes the stream, the elevation is 350 feet. Very soon the county boundary leaves the Derwent and runs northward along the Stanley Burn to the Tyne at Wylam. On the north side of the Derwent the moor between Hedley and Chopwell Park attains 850 feet, and between Ryton and Winlaton a small stream runs down a wooded dene to the Tyne at Blaydon. Along the 10 miles due east, from Shotley by way of Medomsley and Tanfield to Ravensworth, the highest points of the undulated coal-country reach from 750 to 600 feet. The parks and halls of Chopwell, Gibside, and Axwell pleasantly diversify the last 5 miles of the Derwent, which joins the Tyne a short distance above Newcastle. The undulated coal-country south of Newcastle is drained by a small stream called the Team, with a wooded dene at Tanfield, and a castle and park upon its banks at Ravensworth. A narrow tract of Magnesian Limestone belongs to this drainage district, the highest point of which is at West Boldon (307 feet), whence a rivulet runs down to the Tyne at Jarrow. The area of the district is about 200 square miles.

ALTITUDES.

	FEET.		FEET.
Redburn Edge	1833*	Adder Hill, N.E. of Edmundbyers	755*
Knucton Fell	1561*	Allansford Bridge	399*
Bolt's Law	1772*	Derwent Bridge, west of Swalwell	33*
Collier Law, Stanhope	1712*	Gladeley Hill	534*
Cross Hill, near Hunstanworth	1146*	Shotley Bridge Turnpike	349*

10. WEAR DISTRICT.

The county of Durham, towards its western extremity, does not measure more than 10 miles across. The Derwent does not attain the county boundary, and this 10 miles includes the whole breadth of the tract drained by the Wear and half of that drained by the Tees, the other half belonging to Yorkshire. The Wear watershed forms the eastern boundary of Cumberland for 6 miles,

and for the same distance on the north separates Durham and Northumberland. Round the head of the dale sweeps a continuous crescent of high barren grassy or heathery fell, several of the peaks of which exceed 700 yards, whilst the passes into Cumberland, Teesdale, and Allendale are all from 500 to 600 yards in elevation. Due south of Allenheads, only a very short distance from the highest point of the road from Allendale to Wear Head village, Stangend Rigg attains 2075 feet. At the extreme north-west of the county Kilhope Law reaches 2206 feet, with a view extending northward over Whitfield Fell to Simonside and the Cheviots. The four peaks of the western watershed ridge, proceeding from north to south, are Knoutberry Hill (2195 feet), (the knoutberry is *Rubus chamæmorus*, which grows on the upper part of all these fells in profusion), Dead Stones (2326 feet), Burnhope Seat (2368 feet, the highest point in the county), and Ashgill Head (2274 feet). From the village of St. John's Chapel five glens radiate towards the south-west, west, and north-west, like spokes from the axis of a wheel, Kilhope, Welhope, Burnhope, Irishope, and Harthope. On the west side of the boundary peaks just mentioned, we have the Main Limestone at an elevation of 700 yards. In Kilhope, Welhope, and Burnhope it forms crags along the edge of the fells at from 550 to 600 yards, so that everywhere in the peaks masses of gritstone overlie it. Proceeding eastward, before reaching any of the villages, Burtreeford Dike is encountered, which throws down the beds towards the east not less than 90 fathoms. This crosses the upper part of Irishope, bending due north across the lower part of Burnhope and the united burns of Kilhope and Welhope, turns a little eastward, so as to margin with limestone crags the highest point of the Weardale and Allendale road, and then crosses the county boundary. None of these western hopes show much of the limestone cliff. In Burnhope there is a curious bank of crumbling dark-coloured shale with a natural wood of birch, alder, and stunted willows, in which grow *Crepis succisæfolia*, *Carduus heterophyllus*, and *Hieracium gothicum* and *tridentatum*. At Wearhead (1100 feet), the highest village in the dale, the stream has already attained a considerable size. Black Dene on the north is a steeply

sloping short, wooded hollow shaped like the letter Y. There are not here, as in Allendale, many fir plantations at a considerable height on the moor, little crag is to be seen, but the stream is broad, and its channel pleasantly diversified by shelves and boulders of massive blue limestone rock. The population of the dale is considerable; neat, wide-spreading villages, with churches, chapels, and school-houses succeeding each other rapidly at the bottom of the valley, while farm-houses dot the green fields that extend up the hill-side. The ridge in this part is 1000 feet above the stream and the bank is tolerably steep, the distance between the watershed line on the north and south being generally about 6 miles. The upper part of Weardale resembles Wensleydale or Swaledale far more than it does Teesdale, Allendale, or North or South Tynedale. Teesdale is much wilder in its scenery, and altogether exceptional in its botany, and none of the Northumbrian dales have the limestone in their upper part. The village of St. John's Chapel, 2 miles east from Wear Head, is perhaps the most convenient centre for exploring the upper part of the dale; the neighbouring ravine of Harthope, where a little stream tumbles over a succession of limestone edges, is the most picturesque bit of scenery in the neighbourhood. From St. John's Chapel eastward to Stanhope, a distance of 6 miles, the villages are fewer. On the south the glens of Swinhope, Westenhope, and Snowhope, each about 3 miles in length, open out into the main dale, and on the north the more considerable dale of Rookhope, 8 miles in length from the north-west, beginning within a very short distance of Allenheads. In Rookhope are the valuable mines of the Weardale Iron Company, and the limestone shows itself at 1100 feet.

The bridge over Stanhope Burn, at the west end of the town, is 670 feet above sea-level, and the limestone crops out on the hill-side at 800 to 850 feet. The moor upon the north of the town is still 1000 feet above it, the highest point being 1712 feet above sea-level, whilst on the south Monk's Moor, in the direction of Middleton, attains 1854 feet. Frosterley, which is situated 2 miles lower down, is about 500 feet high, and the limestone 150 yards. Above it Bollihope, a glen from the south-west

opens out into the main dale, flanked in the lower part of it by a fine limestone cliff called Bishopley Crag. Soon the limestone dips below the surface, and as we proceed eastward is no more seen. At Wolsingham the Wear receives a small feeder from the north, which is familiar to the readers of Winch's Flora under the name of Westcrow Burn; soon afterwards the Bedburn also, which has several branches and drains a considerable tract of undulated gritstone moor that lies between Wolsingham and Eglestone, joins it upon the south. Now the bounding moors rapidly decline in level and we reach the line of the out-crop of the Coal Measures, which from Satley passes almost due south across the Wear tract by way of Towlaw, Harperley Gate, Witton-le-Wear, stretching, however, several miles to the west to curve round the head of the Auckland Valley, in which are situated several valuable mines. This Auckland stream rises amongst the high moors very near the Tees, in the vicinity of Eglestone, and, after a course of 20 miles towards the east, joins the main river at Bishop Auckland. From Wolsingham to this point, a distance of 12 miles, the course of the Wear has been towards the south-east. Here it turns at a right angle, and with many windings flows towards the north-east till it falls into the sea. Now the rounded moors sink to 900 feet, then to 800 feet, and as we near Durham, to 600 feet. On the north the Browney, from Butsfield and Lanchester, drains a wide extent of moorish coal country, and upon the bank of the valley below it stand the park and castle of Brancepeth. The city of Durham, over-topped by the towers of its noble minster, occupies a commanding position on a hill, three sides of which are washed by the Wear, on the edge of the moorland. Between this and the western escarpment of the Magnesian Limestone lies the lowest ground in this part of the country, across which the main line of railway runs north and south. Past the ruins of Finchale Abbey, the villages of Cocken and Chester-le-Street, and the park and castle of Lambton, the Wear winds through this low country with often wooded and deeply excavated banks: the last 4 miles of its course it flows due east through a break in the limestone till it falls into the sea at Sunderland. The Magnesian

Limestone attains the height of 488 feet at its highest point west of Newbottle.

This drainage tract includes the heart of the county from east to west, and comprises fully one half its total area.

ALTITUDES.

	FEET.		FEET.
Bench mark, Wearhead...	1104*	Rookhope Mining Office	1146*
Daddryshield Bridge	939*	Boltburns Bridge	1074*
Bales Rigg	1296*	Stanhope Burn Bridge ...	671*
Far Rigg	1072*	Copthill Church	1290
Greenfoot Turnpike west of Stanhope.....	761*		

11. TEES DISTRICT.

The Tees rises in Cumberland, on the east side of Cross Fell (2901 feet). It first touches Durham at Crook Burn, 5 miles above the Caldron Snout, and for the whole of the remainder of its course forms the southern boundary of the county. This point is 1600 feet above sea-level, surrounded on all sides by desolate dreary moors. There is scarcely a lonelier tract anywhere in England than the expanse of wild moor that fills up the whole area between Alston, Langdon Bridge, and Dufton, 15 miles across in each direction, with hardly a house or a trace of cultivation to be seen. For 5 miles the river falls but little, but spreads out in a large tarn-like expansion called the Weel, quiet enough for *Ranunculus peltatus* and *Potamogeton rufescens* to grow in it. At the Caldron Snout the scene changes. First, the water becomes ruffled by shelves of rock, and then with a rush, the noise of which mingles with the whirr of grouse, and the bleating of mountain sheep far away amongst these lonely hills, the stream breaks a gorge through the great sweep of basalt, forming in doing so a series of broken rapids, leap after leap in tumultuous succession, the brown stream dashed by the first into an angry white foaming torrent rushing from ledge to ledge down a winding rocky channel, till at last it frees itself from the gorge and spreads out, like a ray of light as it issues from a prism, over a back-ground of broken sharp-edged basaltic columns. The

total depth of the actual fall is 100 feet, and nowhere in Britain have we so deep a fall upon so large a stream. The best point of view for it as a whole is the open ground a short distance below on the Westmorland side of the river, from which the wooden bridge which spans the stream about half-way down the rapids (firm enough in reality) looks frail and dangerous.

There is probably no piece of ground in Britain that produces so many rare plants within a limited space as Widdy Bank Fell. The distance from the Caldron Snout in a direct line due east to Langdon Bridge is 2 miles. The upper part of the fell is like an ordinary heathery moor, and the summit is only 130 feet above the head of the waterfall, which is 1530 feet above sea-level. Along the face of the hill towards the river sweeps a range of basaltic crags like those that form the waterfall, which are known by the name of Falcon Clints, broken, jagged, and irregular, with a bank of fallen blocks below the precipitous cliff for some 2 miles along the stream-side. Along the back of the hill from half a mile above the Caldron Snout eastward till they are thrown down by a fault into the east end of Falcon Clints, stretch low banks of Tyne-bottom limestone, bleached and rendered coarsely granular in texture by the proximity of the igneous rock, and from this copious streams flow down in three directions, westward towards the Weel, due eastward to Harwood Beck (this stream is called the Whey Sike), and south-east towards Widdy Bank House. Within an area of something like 4 square miles we have, upon the crags and banks of these streams, the following rare plants:

Viola arenaria.
Arenaria uliginosa.
Thalictrum alpinum.
Draba incana.
Potentilla alpestris.
Sedum purpureum.
villosum.
Saxifraga aizoides.
stellaris.
hypnoides.
Galium boreale.
Hieracium iricum.
Hieracium pallidum.
anglicum.
Gentiana verna.
Arbutus uva-ursi.
Bartsia alpina.
Elyna caricina.
Juncus triglumis.
Carex capillaris.
Sesleria cærulea.
Allosorus crispus.
Asplenium viride.
Woodsia ilvensis.

Polypodium calcareum.	Tofieldia palustris.
Equisetum variegatum.	Scirpus pauciflorus.
Poa Parnellii.	Armeria maritima.
Galium sylvestre.	Primula farinosa.

On the north of Widdy Bank the Main Limestone reaches an elevation of 1800 feet in Bleak Law, which extends from the Weel to the church in Harwood Dale, and above it the gritstone rises to 2028 feet. This first dale, Harwood Dale, is broad and open, the lower part being filled with grassy fields. There is a good road along the east side of it leading to Alston, and at its head Burnhope Seat attains 2368 feet, and Highfield, just above the Grasshill lead-mines, 2322 feet. The dale is 5 miles long from north to south, and joins Langdon Dale, a narrower dale with steep banks and very little population, at Langdon Bridge (1250 feet), and the united streams fall into the Tees a mile above the High Force. The flat stretch of ground round the point where the streams join is called the Whetstone Sill, and here begin *Potentilla fruticosa*, *Salix phylicifolia*, *Habenaria albida*, *Crepis succisæfolia*, *Hieracium gothicum*, *crocatum*, and *corymbosum*. East of Langdon Bridge the bank of the dale for several miles is steep and girdled conspicuously by the lines of limestone cliff, which, from 2100 feet in Highfield, decline very gradually towards Newbiggin Moor. The peaks of this ridge are Fendrith Hill (2284 feet) and Outberry Plain (2143 feet). From the foot of the Caldron Snout to the head of the High Force the Tees declines in level from 1430 to 1000 feet. The High Force is a very fine waterfall. Here the main stream of the Tees, its waters contracted often into a deep narrow channel, makes a sheer leap of 69 feet into a ravine, the cliffs of which margin the stream for a considerable distance below it. The cliff is dark-coloured basalt, resting upon a mass of dark-coloured indurated shale, and that upon limestone, and when the stream is full the waters flow upon both sides of the massive angular crag which overlooks the main descent. On the Durham side of the river the slope is covered by a large plantation, principally of spruce, and on the Yorkshire side the moor reaches down to the edge of the cliff. A more beautiful spot for a summer-day's excursion than this

ravine, with its never-ending roar of waters, in front the cataract with its ceaseless rush and cloud of misty spray, at the bottom the dark foaming stream flowing rapidly amongst thickly-strewn boulders, margined in the open space below the cliffs with a grove of fantastically shaped juniper bushes, shut in above by its wood-covered slope and ledges of dark crag, can scarcely be desired. Between the High Force and Eglestone, a distance of 9 miles, four streams join the Tees on the north, the burns of Ettersgill, Bowlees, Hudshope, and Eglestone, but the hollows are scarcely more than mere moorland glens. There is a waterfall in the first called Hell Cleft, which is worthy of a visit. Between the High Force and where the Lune on the Yorkshire side joins the Tees the fall is 40 feet per mile. The river-channel is here considerably deeper than above the High Force, and especially during the first 2 miles, past Lower Cronkley Bridge and Winch Bridge there are rapids in the stream, and its banks are craggy and preprecipitous, and often margined with brush-wood and uncultivated moory ground. Above Newbiggin the ridge is 2200 feet in height, and the limestone full 500 yards. Above Eglestone extensive fir-plantations stretch from the town to the top of the moor. East of Newbiggin the limestone falls rapidly, and at Eglestone is lost from the bottom of the dale to reappear below Barnard Castle. The fells now decline to 1000 and 900 feet, but keep their height well up towards the river. North of Barnard Castle a stream rises on the edge of the moors at Langley Dale and flows through Raby to unite with another brook at Streatlam and join the Tees at Gainford. Below Barnard Castle, past Greta Bridge and Wycliffe, the Tees is again bordered by cliffs of limestone. None of the principal collieries fall within this drainage-tract. From Cockfield Fell, the ridge of hill which separates the Auckland from the Raby hollow, a dike of basalt runs south-eastward towards the Tees. At Pierce Bridge the Magnesian Limestone shows itself, trending north-eastward, with usually an escarpment towards the north-west, by way of Aycliffe and Ferry-hill towards the Wear. The highest point which it reaches is at Raisby Hill, near Trimdon, 606 feet in elevation, and 17 miles north of the Tees in a direct line. Here rises the Skerne, which

flows sluggishly with many windings through the level country past Bradbury and Darlington to Blackwell. Still further east there is a stream similar in character but shorter and smaller, which from Sedgefield runs south-eastward to Norton and Billingham. Between Hartlepool and Sedgefield the level scarcely anywhere exceeds 100 feet, and southward it falls still lower. The streams and ponds of this level low-lying tract furnish the best stations for water-plants which there are in the two counties, as for instance, Morden Carrs, through which the railway runs between Bradbury and Aycliffe Stations, and the streams and ditches about Norton and Billingham. From the Tees mouth at Seaton Carew northward to Hartlepool there is very little cliff along the shore, but from this latter point northward the Magnesian Limestone borders it with fine cliffs in several places, especially at the Black Hall Rocks, and from Horden Dene northward the rocky wall is carried forward almost without interruption. We have regarded the denes of the Magnesian Limestone from Hawthorn Dene southward as comprised in this drainage tract. The most considerable of these is Castle Eden Dene, a thickly-wooded picturesque craggy ravine which extends from the shore midway between Hartlepool and Sunderland for a distance of five miles due west into the heart of the Magnesian Limestone range. The hills round the upper part are from 400 to 500 feet above sea-level. Hesleden Dene, a similar glen a short distance to the south, is about the same length but narrower. Hawthorn and Horden Denes, nearer Sunderland, are both much smaller and shorter. The area of the district is about 300 square miles.

ALTITUDES.

	FEET.		FEET.
Highfield, above Grasshill	2322*	Langdon Bridge	1255
Fendrich Hill	2284*	High Force Fall	942–1005
Monk's Moor, above Middleton	1954*	High Force Inn	1050
Raven Seat	1927*	Winch Bridge	856*
James's Hill, Newbiggin	2215*	Middleton Bridge over Tees	729*
Outberry Plain	2142*	Middleton Bridge over Middleton Beck	765
Widdy Bank Fell	1660	Junction of Middleton and Hamsterley with Barnard Castle Road	1025
Widdy Bank Farm-house	1286		
Caldron Snout	1430-1530		

PART II.

ENUMERATION OF THE PLANTS.

EDITED FOR CHEVIOT-LAND BY DR. G. R. TATE.

FOR TYNE-LAND AND DURHAM BY J. G. BAKER.

Bibliography.—The following are the principal works, arranged in order of time, which contain information about the special localities of Northumbrian and Durham plants:—

1552. Turner's Herbal: a second edition in 1568.

1744. Synopsis of British Plants, by John Wilson, Newcastle-on-Tyne. An English translation of Ray's Synopsis.

1769. The Natural History and Antiquities of Northumberland, 2 volumes quarto, by the Rev. John Wallis, A.M.

1777. The British Flora, by Stephen Robson. Published at York.

1805. Turner and Dillwyn's Botanist's Guide through England and Wales.

1805. The Botanist's Guide through the county of Northumberland, by N. J. Winch, F.L.S., John Thornhill, and Richard Waugh. Vol. 2 in 1867.

1807. Catalogue of Plants in the vicinity of Berwick, by J. V. Thompson.

1825. Winch's Essay on the Geographical Distribution of Plants through the counties of Northumberland, Cumberland, and Durham.

1827. Natural History of the vicinity of Stockton-on-Tees, by John Hogg, A.M.

1829. Flora of Berwick-upon-Tweed, by Dr. George Johnston.

1831. Flora of Northumberland and Durham, by N. J. Winch; from the Transactions of the Natural History Society of Northumberland, Durham, and Newcastle-upon-Tyne. Quarto; an appendix in 1836.

1835. New Botanist's Guide to the localities of the rarer Plants of Britain on the plan of Turner and Dillwyn's Botanist's Guide, by H. C. Watson.

1847. Cybele Britannica; or British Plants and their Geographical Relations, by H. C. Watson. Vol. 2, 1849; vol. 3, 1852; vol. 4, 1859; supplement, 1860.

1848. Transactions of the Tyneside Naturalists' Field Club began.

1853. Natural History of the Eastern Borders: part 1, Botany, by Dr. G. Johnston.

The first three of these works contain only the mention of a few scattered stations. The history of Wallis contains a greater number, but botany was not the author's forte, and he registered a considerable number of species in error. During the first thirty years of the century the botany of the two counties was very thoroughly searched out by Winch and his colleagues, and the Flora of 1831 contains a full *resumè* of the result of their labours. They did their work so well that the number of species which have been added to the list since that date is very inconsiderable; and the essay of 1825 shows, for that time, a remarkable appreciation of the influences which regulate and modify the distribution of species. The *Cybele Britannica* is an elaborate work in four volumes, treating of the distribution of plants within the bounds of Britain in the fullest detail. Of the herbaria which we have consulted in the preparation of our enumeration that of Winch is the most extensive, and affords a full opportunity of

verifying the nomenclature of the Flora. Circumstances which we need not enter upon here have caused it to be broken into two halves and divided between the Museum at Newcastle and the Linnean Society in London. The collections of Robertson and an interleaved copy of the Guide of 1805, with copious annotations, are in the Newcastle Museum. The collection of the late Wm. Backhouse, of Darlington, was unfortunately consigned to the hands of Mr. Baker for use in the preparation of this work when his herbarium and library were totally destroyed by fire in 1864 and perished in the conflagration, as did also a large number of plants gathered by the late Mr. John Storey, which were the property of the Blyth Mechanics' Institute. Besides these, we have been indebted to the Rev. W. W. Newbould for comparing our Catalogue, after it was written out, with the herbarium of Professor Oliver, now the property of University College, London.

Classes of Citizenship.—A point which requires to be carefully attended to in enumerating the plants of any particular district, is to draw a line of distinction as clearly as circumstances will allow between those which really belong to it as aboriginal inhabitants and those which owe their introduction to human intervention. In any long-settled, long-cultivated tract of country, the modification which has been brought about by human agency is, of necessity, very considerable. Around the place where man fixes his dwelling swamps, moors, and woods disappear to make way for cultivated fields, roads, and gardens: the bog, heath, and shade-loving plants are restricted in their range or altogether exterminated; and the places which these occupied are filled up by the species which man grows for food or other purposes and the weeds which these bring in their train. Out of the eleven hundred and thirty-seven enumerated in the following list, we can only claim with confidence eight hundred and forty-four as genuine natives. But a considerable proportion of the introductions are now very thoroughly settled down. Following the nomenclature of the *Cybele Britannica* we have called the well-established agricultural weeds by the name of *Colonists*, and the

well-established plants which yet are likely to have been introduced by horticulture by the name of *Denizens*. Of the first class we have examples in the poppies, fumitories, *Chrysanthemum segetum*, *Centaurea cyanus:* of the second in *Chelidonium majus*, the hellebores, and *Saponaria officinalis*. The species clearly introduced and not well settled in are called *Aliens*. These introduced plants have come from various parts of the world. In the Flora of Britain we have instances of American plants which have thus become "naturalised" in *Erigeron canadensis*, *Mimulus luteus*, *Coronopus didyma*, *Œnothera biennis*, *Galinsoga parviflora*, and *Anacharis alsinastrum*. Our four common poppies grow really wild in grassy places, *Rheas* in Sicily, and the other three in Greece and the Crimea. *Centaurea cyanus* also comes from Sicily, the common wallflower grows wild upon rocks in Greece, *Datura stramonium* on the shores of the Caspian, *Corydalis lutea*, *Vinca major*, and *Petroselinum sativum* also in the south-east of Europe. We have not attempted in this list to trace out the introduced species to their sources, but only to place them in their correct classes of citizenship, so far as the two counties are concerned, as follows:—

1.—The Natives, so far as we can now judge, the aboriginal possessors of the soil.

2 and 3.—The Colonists and Denizens, the well-established importations of the historic period.

4.—The Aliens, importations not fully established.

5.—The Incognita, species to be rejected from the list, either as being extinct or requiring confirmation before they can be claimed with safety.

Types of Distribution.—The readiest means of showing the relation which the Flora of any county or province of Britain bears to that of the whole island is furnished by Mr. Watson's classification of the species under their "types of distribution" as follows, viz.:—

1. *British Type.*—Species which are more or less generally diffused throughout the whole or nearly the whole of Britain.

2. *English Type.*—Species which have their head-quarters in England, especially in the southern provinces, and become rare and finally cease altogether towards the north.

3. *Scottish Type.*—Species which in a manner contrary to those which make up the last type have their head-quarters in Scotland or the North of England, and become rare, and finally cease altogether southward.

4. *Highland Type.*—The boreal Flora in a more intense degree. Species which have their head-quarters amongst the Scotch Highlands, and are only found southward in the vicinity of elevated mountains.

5. *Germanic Type.*—Species which have their head-quarters in the South-east of England, and run out northward and westward.

6. *Atlantic Type.*—Species which have their head-quarters in the South-west of England, and run out northward and eastward.

7. *Intermediate Type.*—Species which have their head-quarters in the South of Scotland and North of England, and run out both northward and southward.

8. *Local Type.*—Species too much restricted in their range to fall properly under any of the preceding.

Explanation of the manner in which the Distribution of Species is stated.—In the enumeration of species we have followed Mr. Watson's list, as given in the fourth volume of the *Cybele Britannica*, as a standard of nomenclature and species-limitation. As his general and partial numerical summaries are all based upon this list the advantage of adopting it in local works is obvious. Then we give the class of citizenship to which we consider the plant in Northumberland and Durham belongs: then its general type of distribution as just explained. After the word "area" follows the initial letter C, N, D of the vice-county or vice-counties in which the plant occurs, one or all

three, as the case may be. After the word "range" we give the climatic zones in which the plant grows, beginning to count from below, so that one denotes the Lower, two the Middle, and three the Upper zone. Then follows, for the plants restricted in the manner which the words are intended to indicate, the adjectives *Xerophilous* or *Maritime*.

For an explanation of what is meant by the term Xerophilous we must refer our readers to the postscript to chapter I. The species marked Maritime are those, about fifty in number, which are restricted to the sea-coast. Then follows a paragraph stating in what kinds of situation the plant grows, its frequency and its special localities if it is considered rare enough to make it worth while to enumerate them. It is only for quite the rarer species that the particular stations are stated with any considerable detail. In enumerating the localities we always begin with the north and work southward. "F" means Winch's Flora, and where nothing follows it must be understood that we have no confirmation of the occurrence of the plant as stated since 1831, and in all such cases it may be held that confirmation has become desirable. "R" means recent collectors, and where it is employed implies that we have confirmation of the occurrence of the plant since 1831. The species marked R, generally but not quite invariably, are those which are mentioned in the reports of the Club as having been gathered upon the excursions. A note of admiration implies that a specimen gathered by the collector whose name is mentioned has been examined and that we endorse the name. The other letters used, T. and B., are the initials of the editors of the Catalogue, and where used imply that we have verified, not only the name of the plant, but also the locality. For the figures which relate to the altitudes attained by various species Mr. Baker is responsible where the name of no one else is mentioned. In connection with this point he desires to express his obligations to Sir Henry James, the Director of the Ordnance Survey. At the time when the information was required none of the contour ordnance maps for the higher portions of the two counties were issued; but Sir Henry James, upon application being made to him, kindly furnished from the survey records a

list of the altitudes of a large number of easily accessible points; and from these as a basis the elevations which the plants attain were measured by means of the Aneroid barometer, principally during two excursions of a fortnight each, the first, in which he had the company and aid of the Rev. W. W. Newbould in Allendale, Weardale, and Teesdale in the summer of 1865, and the other in Coquetdale and the Cheviots in 1866. We defer a general summary of the list to its conclusion.

I. FLOWERING PLANTS.

Class 1. DICOTYLEDONS OR EXOGENS.

Division 1. THALAMIFLORÆ.

Order 1. RANUNCULACEÆ.

1. THALICTRUM, *L.*

1. *T. alpinum*, L. Native. Highland type. Area D. Range 2.

In Teesdale on Widdy Bank Fell, beginning at the head of the streams and following them downwards, but not abundant, and it has been gathered by Mr. W. H. Brown as low down the river as Winch Bridge. Range of altitude 300–500 yards.

2. *T. minus*, L. Native. Scottish type. Area C, N, D. Range 1.

Common along the coast-line in sandy ground: Alnmouth, Warkworth, Bambro', Newton, Blyth, Hartley, Cullercoats, Tynemouth, South Shields, Castle Eden, Hartlepool, Seaton Carew, &c. Inland we only know the typical plant clearly from Tunstall Hill (W. H. Brown) on the Magnesian Limestone.

3. *T. flexuosum*, Rich. Native. Intermediate type. Area C, D. Range 1.

The typical form occurs on the bank of the Tweed at Spring Gardens and Milne Graden, and in the neighbourhood of the Tees from Newbiggin and Middleton as low down as Baydales

near Darlington. A plant which grows on the basaltic crags at Kyloe, Howick, and Ratcheugh, recedes from this in the direction of *T. minus* by its hollow stem, smaller size, smaller leaflets, which are glaucous and somewhat glandular beneath, and few-flowered, scarcely leafy, panicle. Range of altitude 0–300 yards.

4. *T. flavum*, L. Native. English type. Area N, D. Range 1.

Absent from Cheviot-land. In Tyne-land on the bank of the Tyne near Ovingham (F.). In Durham by the Team near Lamesley, the Wear near Sunderland, plentiful in Morden Carr, and occurring also at Hell Kettles and in several places in the low country near the Tees about Greatham, Yarm, and Norton.

2. ANEMONE, *L.*

1. *A. nemorosa*, L. Native. British type. Area C, N, D. Range 1, 2.

Everywhere common in woods and shaded and heathy places, ascending high up the Brizzle ravine on Cheviot (J. Hardy), and in the Tees district to 550 yards in Harwood Dale (B.).

3. ADONIS, *L.*

A. autumnalis, L. Alien.

In a potato-field near Norton (J. Hogg).

4. MYOSURUS, *L.*

1. *M. minimus*, L. Native. Germanic type. Area N. Range 1.

On the Cowhill near Newcastle (F. R!). Hedgebank in Coniscliffe Lane, near Darlington (Harriman!), the station now built over.

5. RANUNCULUS, *L.*

1. *R. aquatilis*, L. Native. British type. Area C, N, D. Range 1, 2.

Common in ponds and ditches. Of the subordinate forms *R.*

heterophyllus, *floribundus*, and *Drouetii* are frequent, the true *peltatus* and *trichophyllus* apparently rare. The former grows in the Breamish at Branton, and abundantly in the Weel at an elevation of 500 yards; and the latter we have gathered in a pond near the edge of the cliff a little north of Marsden.

2. *R. Baudotii*, Godr. Native. English type. Area D. Range 1.

In the salt-water ditches about Seaton Carew (Rev. F. J. A. Hort). No doubt this occurs in other places in brackish water, but it cannot be distinguished from the preceding without close examination. It is abundant in the salt-marshes at the Tees' mouth on the Yorkshire side.

3. *R. circinatus*, Sibth. Native. English type. Area C. Range 1.

In the lough at Holy Island, where it was first noted by Professor Babington. Swinhoe Links (W. Richardson). Ponds on Alnwick Moor (T.).

4. *R. fluitans*, Lam. Native. English type. Area C, N, D. Range 1.

Frequent in the Cheviot-land streams, Tweed, Breamish, Wooler Water, Aln, and Coquet. In the North Tyne near Bellingham (Mr. Makepeace!). In the Skerne a little above its junction with the Tees (W. Foggitt).

5. *R. hederaceus*, L. Native. British type. Area C, N, D. Range 1, 2.

Frequent in watery places, especially in the upland tracts, ascending to 350 yards in Dunsdale, 400 yards in Teesdale, and 300 yards in Allendale, Weardale, and Coquetdale.

6. *R. cænosus*, Guss. Native. English type. Area N. Range 1.

In the Wansbeck district in a plashy place by the road-side between Hartburn and Scot's Gap Station, 150 yards (B.).

7. *R. ficaria*, L. Native. British type. Area C, N, D. Range 1, 2.

Everywhere common in damp fields and shaded places, ascending in Teesdale to High Force Wood, 350 yards.

8. *R. flammula*, L. Native. British type. Area C, N, D. Range 1, 2.

Common in watery places, especially in the upland tracts, ascending to 600 yards in Harwood Dale and Coal Cleugh, West Allendale.

9. *R. lingua*, L. Native. English type. Area C, N, D. Range 1.

Watery places, not rare. In Cheviot-land in Newham Lough, Learmouth Bog, a pond at Spindlestone, and the fosse of Dunstanbro' Castle. In Tyneland in a pond at Widehaugh near Corbridge (F.), Prestwick Carr, and a pond on the moor top near Wall Town Crags, where it grows amongst *Typha* at an elevation of 250 yards (Rev. Dr. Cundal). In Durham in Shincliffe Beck (Miss Wharton), Houghall near Durham (Mr. Bungey), Hell Kettles near Darlington, and very fine and plentiful in Morden Carrs.

10. *R. auricomus*, L. Native. British type. Area C, N, D. Range 1, 2.

Woods and shaded hedge-banks, frequent, ascending to 1600 feet in Dunsdale (J. Hardy).

11. *R. acris*, L. Native. British type. Area C, N, D. Range 1–3.

Everywhere common in grassy places, ascending to 750 yards on Cheviot, 650 yards on Highfield, 550 yards in East and West Allendale.

12. *R. repens*, L. Native. British type. Area C, N, D. Range 1–3.

Common in damp and grassy places, ascending to 800 yards on Cheviot, 750 yards on Highfield, and 2000 feet on Stangend Rigg.

13. *R. bulbosus*, L. Native. British type. Area C, N, D. Range 1, 2.

Common in grassy places, ascending in Teesdale to Langdon Bridge, 400 yards.

14. *R. hirsutus*, Curt. Colonist. English type. Area C. Range 1.

Cultivated fields, very rare. Alnwick (R. Embleton, A.). Bambro' and Long Houghton (T.).

15. *R. sceleratus*, L. Native. British type. Area C, N, D. Range 1.

Ditches and banks of ponds in the low country, not unfrequent.

16. *R. parviflorus*, L. Native? English type. Area D. Range 1.

Hedgebank between Cockerton and Archdeacon Newton, north of Darlington, gathered there by Jas. Ianson and W. Backhouse (F!). Newton is misprinted Norton in the Flora, which may perhaps have led astray some seekers for the plant.

17. *R. arvensis*, L. Colonist. English type. Area C, N, D. Range 1.

A frequent weed in cultivated fields in the low country.

6. CALTHA, *L.*

1. *C. palustris*, L. Native. British type. Area C, N, D. Range 1–3.

Everywhere common in ditches and swamps, ascending to 650 yards on Highfield, 600 yards on Coal Cleugh, and 550 yards on Cheviot. The narrow-petalled variety (*C. Guerangerii*, Boreau) has been gathered near Staindrop (James Backhouse), and near the Wansbeck at Mitford (B.).

7. TROLLIUS, *L.*

1. *T. europæus*, L. Native. Scottish type. Area C, N, D. Range 1–3.

Frequent amongst the hills by the stream sides and in damp

meadows, ascending to the Henhole and Brizzle ravines on Cheviot and to 650 yards in Harewood Dale, descending to Rugley, Hulne, and Calish Woods, Hartford Bridge on the Blyth, Whittle Dene and the Tyne side at Bywell; and it even occurs in the low Red Sandstone country, as in the flat between Norton and Billingham (J. Hogg), and in a field near the brick-yard at Great Stainton (M. A. Lawson).

8. HELLEBORUS, *L.*

1. *H. viridis*, L. Denizen. Germanic type. Area N, D. Range 1.

Banks of the Aln near Alnwick Abbey (T.). Bank of the Wansbeck near Morpeth (Rev. T. Finch!). In a small ravine at South Hylton near Sunderland (W. H. Brown!). Banks of the Tees near Whorlton (Rev. J. Harriman. F.).

2. *H. fœtidus*, L. Denizen. Germanic type. Area N, D. Range 1.

Wood on the north side of the Tyne a little above the Chain Bridge at Hexham (A. Hancock). In Tunstall Hope, half a mile south of Sunderland (W. H. Brown!). Road-side between Herrington and Houghton-le-Spring (Miss Wharton). Banks of the Tees a little below Winston Bridge (Rev. J. Harriman. F.).

9. AQUILEGIA, *L.*

1. *A. vulgaris*, L. Native. Xerophilous. English type. Area N, D. Range 1.

In Cheviot-land in a wood near Malcolm's Cross, Alnwick, alien (T.). Truly wild at Ninebanks in West Allendale (R. Murray), in Teesdale about Middleton, 250 yards, in most of the Magnesian Limestone denes, and perhaps also about the Derwent at Allansford. It has been gathered in several other places as a straggler from garden cultivation.

10. DELPHINIUM, *L.*

1. *D. Ajacis*, L. Alien.

Very rare as a weed of cultivated fields. Clover field near the

Lough House on Holy Island (Winch. F!). A single specimen in a field near Tuggall, 1864 (R. Embleton). In a limestone quarry near Bishopwearmouth (W. Backhouse. F!). Corn-fields at Norton (J. Hogg).

11. ACONITUM, *L.*

1. *A. napellus*, L. Alien.

An occasional garden escape. By a stream behind Cullercoats (W. H. Brown). Bank of a stream near Riding Mills (E. Procter). Grown in gardens up to 550 yards.

Order 2. BERBERACEÆ.

1. BERBERIS, *L.*

1. *B. vulgaris*, L. Denizen. English type. Area C, N, D. Range 1.

Rare in thickets and hedgerows and not clearly indigenous. Chatton and Hulne Woods (T.). Hedge between Weetwood and Wooler (B). Pandon Dene and Elswick near Newcastle (Robertson). Bearpark near Durham (Rev. J. Symons. F.). Hedges near Darlington, Witton-le-Wear, Picktree, and Chester-le-Street.

Order 3. NYMPHÆACEÆ.

1. NYMPHÆA, *L.*

1. *N. alba*, L. Native. British type. Area N. Range 1.

Truly wild only in Greenley and Broomley Loughs, and in a pond south-east of Wall Town Crags: elevation about 700 feet. Often planted, as in the Aln near Alnwick, and ponds at Howick and Wallington.

2. NUPHAR, *Sm.*

2. *N. lutea*, Sm. Native. English type. Area C, N, D. Range 1.

Ponds and streams, frequent in the low country. Kemmer Lough near Eglingham, Crag Lough, Prestwick Carr, and in the Blyth, Ouseburn, Pont, Skerne, &c. It ascends from sea-level

nearly to 250 yards. A plant found long ago by Sir John Trevelyan in Chartners Lough on the Wallington Moors, and thence transported to Wallington, appears to agree with the north European *N. intermedium* of Ledebour, a subspecies not known elsewhere in Britain. This is considered by Professor Caspary a hybrid between *N. lutea* and *pumila*, but it cannot possibly be so here.

Order 4. PAPAVERACEÆ.

1. PAPAVER, *L.*

1. *P. hybridum*, L. Colonist. English type. Area D. Range 1.

In the Magnesian Limestone tract to be seen occasionally about Whitburn, Cleadon, Fulwell, and Sunderland. It is given by Winch as an Alnwick plant on Miss Forster's authority, but has not been seen lately.

2. *P. argemone*, L. Colonist. British type. Area C, N, D. Range 1.

Cultivated fields, frequent, ascending to 350 feet near Wooler.

3. *P. dubium*, L. Colonist. British type. Area C, N, D. Range 1.

Common in cultivated fields, seen at 150 yards near Roddam, in Coquetdale at Holystone, and in Weardale as high as Frosterley (500 feet).

4. *P. rhœas*, L. Colonist. British type. Area C, N, D. Range 1.

Common in cultivated fields, ascending in Coquetdale above Rothbury, and seen in Teesdale at 700 feet. *Var. strigosum* in a field of lucerne near Cleadon (B.).

5. *P. somniferum*, L. Alien.

An occasional straggler from garden cultivation. Alnwick, once cultivated (R. Embleton), stream side below Wooler, Mitford, St. John's in Weardale, Norton, Seaton Carew, &c.

2. CHELIDONIUM, *L.*

1. *C. majus*, L. Denizen. English type. Area C, N, D. Range 1.

Frequent in hedges in the neighbourhood of farm-houses and country villages, ascending in Weardale to Eastgate, 850 feet.

3. GLAUCIUM, *Tourn.*

1. *G. luteum*, Scop. Denizen. English type. Maritime. Area D. Range 1.

On the sea-bank at Seaton Carew, once plentiful, but now nearly or quite extinct.

Order 5. FUMARIACEÆ.

1. CORYDALIS, *D. C.*

1. *C. claviculata*, D. C. Native. British type. Area C, N, D. Range 1.

Not unfrequent on the hilly tracts from the Cheviot to the Tees, especially on sandstone, ascending to Chattlehope Spout in Redesdale (Professor Oliver and W. H. Brown) and 250 yards near Wooler (T.), descending to Heaton Dene.

2. *C. lutea*, D. C. Alien.

An occasional straggler from garden cultivation. Hulme Abbey (T.). Tuggal Hall near Embleton (R. Embleton). Old walls at Harnham and Netherwitton (F.) Ruins of the old Roman station at Chesters (W. H. Brown!). A native of Italy.

3. *C. solida*, Sm. Alien.

An occasional garden escape. Plantation at Beadnell (R. Embleton!), and the commonly cultivated *Dielytra formosa* is also occasionally seen in the same way.

2. FUMARIA, *L.*

1. *F. capreolata*, L. Colonist. British type. Area C, N, D. Range 1.

Of the subspecies *F. Borœi*, Jord., is much the commonest with

us, and has been seen at Wooler, Roddam, Holy Island, Alwinton (at 250 yards), Harbottle, Embleton, Hexham, North Shields, Elswick, Gateshead, Sunderland, Durham, and in many other places. For *F. pallidiflora*, Jord., the only certain stations we can quote are fields at Staindrop (J. Backhouse!), and at Stainton (W. Backhouse!), both in Durham.

2. *F. officinalis*, L. Colonist. British type. Area C, N, D. Range 1.

Everywhere common in cultivated ground, ascending in Teesdale to 700 feet.

3. *F. micrantha*, Lag. Colonist. English type. Area C. Range 1.

Field near the lough on Holy Island (T.).

Order 6. CRUCIFERÆ.

1. CAKILE, *Gaertn.*

1. *C. maritima*, Scop. Native. Maritime. British type. Area C, N, D. Range 1.

Frequent in sandy ground all along the coast-line.

2. CORONOPUS, *Gaertn.*

1. *C. Ruellii*, Gaertn. Native. English type. Area C, N, D. Range 1.

Occasionally in waste ground, especially near the sea. Berwick, Alnmouth, Holy Island, Newcastle, Cullercoats, Sunderland, Hartlepool, &c.

2. *C. didyma*, Sm. Alien.

Embleton, a weed in cultivated ground (R. Embleton).

3. ISATIS, *L.*

1. *I. tinctoria*, L. Alien.

Has been sometimes cultivated and found occasionally in waste places.

4. THLASPI, *L.*

1. *T. arvense*, L. Colonist. British type. Area C, N, D. Range 1.

A rare weed of cultivated ground. Ord fields and other places near Berwick (Johnston). Field a short distance north of Wooler (James Hardy). Dunstan Square and between Lesbury and Warkworth (R. Embleton). Heaton Dene and fields near Gateshead (F!).

2. *T. alpestre*, L. Native. Intermediate type. Area N, D. Range 1–3.

This species shows a curious preference for lead-mines, and has a wide vertical range in the lead-districts. There are two varieties, of which *T. sylvestre*, Jordan, grows near the Allen at Thornhaugh (G. S. Brady!); plentifully with *Cochlearia* about the Langlee mines not far distant from the first station; by the Tyne in various places from Featherstone Castle as low down as Bywell; and in the wood on the north side of the Tees at Winch Bridge (B.); and *T. occitanum*, Jord., in Weardale, on the north side of the stream below Eastgate, where it was first noticed by Mr. T. J. Foggitt (250 yards); and about the Grasshill mines on Highfield, ascending to 750 yards (B.).

5. CAPSELLA, *Vent.*

1. *C. bursa-pastoris*, D. C. Native. British type. Area C, N, D. Range 1, 2.

Everywhere common in cultivated fields and waste ground, ascending to 1200 feet in Teesdale, 1340 feet on Rookhope Moor, 1500 feet on Kilhope, and 1530 feet above Allenheads.

5. TEESDALIA, *R. Br.*

1. *T. nudicaulis*, R. Br. Native. English type. Area C, N. Range 1, 2.

Not unfrequent about Wooler amongst the porphyritic debris. Yevering Bell (nearly 400 yards), Maiden Well, Hellpath near

Common Burn, banks of the Wooler Water between Langlee-ford and the town, Ingram, Powburn, &c. Gathered also upon the basalt at Wall Town Crags by the Rev. A. Headley and others, and near Embleton by Mr. Embleton.

7. IBERIS, *L.*

1. *I. amara*, L. Alien.

A casual weed in cultivated fields and by road-sides. Waste ground at Alnmouth (T.). Road-side between Holystone and Harbottle (B.). Corn-field near Tarset (Professor Oliver!). Ouseburn (Robertson!). Hoferd Banks and Tyne side near Hexham Bridge (F.).

8. LEPIDIUM, *L.*

1. *L. latifolium*, L. Denizen. English type. Area C, N, D. Range 1.

Sandstone quarry above the old ford at Norham (Miss Douglas, Dr. Johnston). Cliff between Priors' Haven and the castle at Tynemouth (F. R!), now destroyed there. Wear side near Durham Abbey (F!). Limestone quarry at Hartlepool (J. Hogg!). Bank facing the sea north of Seaton Carew (E. Robson, F! M. A. Lawson). The Hexham plant is *L. campestre*.

2. *L. Smithii*, Hook. Native. British type. Area C, N, D. Range 1.

Occasionally in cultivated fields in dry soil, less frequent with us than the next. Bamborough, Rothbury, Riding Mills, Winlaton, Newcastle, &c.

3. *L. campestre*, R. Br. Native. British type. Area C, N, D. Range 1.

Not uncommon in similar places to the preceding, ascending to the limestone quarries at Lowick (400 feet), and in Tynedale to fields at Slealey (600 feet).

9. COCHLEARIA, *L.*

1. *C. officinalis*, L. Native. British type. Area C, N, D. Range 1–3.

The typical form is common along the coast-line. The var. *alpina* is very rare amongst the Cheviots, occurring sparingly only in the Brizzle and Henhole, but frequent in Allendale, Weardale, and Teesdale, and carried down into the low country along the streams.

2. *C. danica*, L. Native. Maritime. British type. Area C, N, D. Range 1.

Scattered on rocks along the coast; Farne Islands, Holy Island, Newbiggin, Cullercoats, Tynemouth, Hartlepool, Seaton Carew, &c.

3. *C. anglica*, L. Native? Maritime. English type. Area N. Range 1.

On the coast, not seen recently. Bank of the Tyne at the mouth of Coble Dene, North Shields (Robertson, F!). Reported also in the Flora from Holy Island and by the Wear at Sunderland.

10. ARMORACIA, *Rupp.*

1. *A. rusticana*, Rupp. Alien.

An occasional straggler from gardens.

11. DRABA, *L.*

1. *D. incana*, L. Native. Xerophilous. Highland type. Area D. Range 2.

Confined to the high limestone scars of Upper Teesdale and Weardale. In the former dale we have seen it on Falcon Clints, Widdy Bank Fell, Newbiggin Moor, and ascending to the Upper Limestone of Bleak Law, and in the latter in Kilhope and Burnhope. Range of elevation 450–600 yards.

2. *D. verna*, L. Native. British type. Area C, N, D. Range 1, 2.

Common on walls and dry banks, ascending to the Main

Limestone scars of Kilhope and Bleak Law (600 yards). The short round-podded variety (*Erophila brachycarpa*, Jord.), has been gathered by Mr. W. H. Brown on a wall in Tynedale at Riding Mills.

12. CAMELINA, *Crantz.*

1. *C. sativa*, Crantz. Alien.

An occasional weed in cultivated fields.

13. ALYSSUM, *L.*

1. *A. calycinum*, L. Alien.

Like the preceding. On the railway side south of Warkworth Station (W. Richardson !).

14. CARDAMINE, *L.*

1. *C. amara*, L. Native. British type. Area C, N, D. Range 1.

Not unfrequent by the side of streams, ascending in Teesdale to the foot of the High Force, 300 yards (W. H. Brown).

2. *C. pratensis*, L. Native. British type. Area C, N, D. Range 1–3.

Common in damp grassy places, ascending to 600 yards in Coal Cleugh and East Allendale, 700 yards on Highfield, and 800 yards on Cheviot.

3. *C. hirsuta*, L. Native. British type. Area C, N, D. Range 1–3.

Frequent in damp places, ascending on Highfield to 650 yards.

4. *C. sylvatica*, Link. Native. British type. Area C, N, D. Range 1–3.

Frequent in shaded and damp situations, ascending to 650 yards in Dunsdale, the Brizzle, and on Highfield, and 600 yards in Welhope and East Allendale.

15. ARABIS, *L.*

1. *A. thaliana*, L. Native. British type. Area C, N, D. Range 1, 2.

Walls, rocks, and dry sandy ground, not uncommon, ascending in Teesdale to 500 yards on Falcon Clints, and in Coquetdale to porphyritic crags at Shillmoor.

2. *A. hirsuta*, R. Br. Native. Xerophilous. British type. Area C, N, D. Range 1, 2.

Not known upon any of the Cheviot crags in the Wooler neighbourhood, but occurring on the porphyry about Alwinton, and frequent on the basalt and Mountain and Magnesian Limestone from the Aln to the Tees, ascending in Harwood Dale to 550 yards.

16. TURRITIS, *L.*

1. *T. glabra*, L. Native. Germanic type. Area N, D. Range 1.

Dry banks, rare. Warden near Hexham (R. Wigham). Hedge-bank between Corbridge and Anick Grange (F. Scott). Walls at Ovingham (F.). Stanley Burn near Wylam (R. B. Bowman, A.). Side of the high-road near Gainford (F. B.).

17. BARBAREA, *R. Br.*

1. *B. vulgaris*, R. Br. Native. British type. Area C, N, D. Range 1.

Common in damp places and by the side of streams, ascending in Weardale to Frosterley (200 yards). The Northumbrian plant which has been referred to *B. arcuata*, gathered by Mr. Borrer near Alnwick, differs from the type by its subpatent pods and less developed lateral leaf-lobes.

2. *B. præcox*, R. Br. Alien.

An occasional weed. Hedge-bank between Wooler and Earl (Dr. Johnston). In Weardale by the road-side near Frosterley (B.).

18. NASTURTIUM, *R. Br.*

1. *N. officinale*, R. Br. Native. British type. Area C, N, D. Range 1, 2.

Everywhere common in streams and ditches, ascending in Teesdale to Middleton, in Weardale above St. John's Chapel (350 yards).

2. *N. terrestre*, R. Br. Native. English type. Area C, N, D. Range 1.

Damp places, rare. Bank of the Tweed between Norham and West Ord (Dr. Johnston). Old quarry at Stamford (T.). Banks of the Aln near Alnwick (R. Embleton, A.). Borders of Prestwick Carr (F!). Blaydon (John Storey!). Banks of the Skerne near Darlington (E. Robson, F.).

3. *N. sylvestre*, R. Br. Native. English type. Area C, N, D. Range 1.

By the Tweed at Birgham Haugh down to the Union Bridge (Dr. Johnston). Shores of the Tyne at Corbridge, Benwell, and Stella (F. R!) Banks of the Team near Redheugh and of the Derwent below Swalwell (R. B. Bowman). Wear side at Finchale Abbey (Miss Wharton). Banks of the Skerne near Darlington (Miss M. J. Hancock). Not unfrequent in ditches about Norton (John Hogg).

19. SISYMBRIUM, *L.*

1. *S. officinale*, Scop. Native. British type. Area C, N, D. Range 1.

Common by road-sides and in waste ground, ascending Coquetdale above Alwinton and in Weardale to Westgate (300 yards).

2. *S. Sophia*, L. Native. English type. Area C, N, D. Range 1.

Not unfrequent in similar situations to the preceding. East Ord, Learmouth, Bamborough, Budle, Bulmer, Holy Island, Belford, Alnwick, Embleton, Beadnell, Morpeth, Corbridge, Hexham,

Newcastle, Cleadon, Hartlepool, Boldon, Dunsdale, Port Clarence, &c.

20. ERYSIMUM, *L.*

1. *E. cheiranthoides*, L. Alien.

Very rare as a weed of cultivated fields.

2. *E. alliaria*, L. Native. British type. Area C, N, D. Range 1.

Common on hedge-banks, ascending in Teesdale to Newbiggin (300 yards).

21. CHEIRANTHUS, *L.*

1. *C. Cheiri*, L. Alien.

Often established on old ruins. Hulne Abbey, Warkworth Castle and Priory, Holy Island Priory, Brinckburn Priory, Norham Castle, walls at Durham, rocks at Southwick, Priors' Haven, &c. A native of the South-west of Europe.

22. HESPERIS, *L.*

1. *H. matronalis*, L. Alien.

An occasional straggler from garden cultivation. Hulne woods near the abbey (T.) Embleton (R. Embleton). Meadow at Chester-le-Street (G. T. Fox). Road-side on Cleadon Hill (W. H. Brown).

23. BRASSICA, *L.*

1. *B. oleracea*, L. Alien.

Plentiful down the face of the steep cliff on the sea-ward side of Tynemouth Priory.

2. *B. rapa*, L. Colonist. English type. Area C, N, D. Range 1.

Frequent by stream-sides and as a weed in cultivated fields. It is cultivated in Allendale up to 550 yards, and has been grown at Grasshill at 2000 feet.

3. *B. napus*, L. Colonist. English type. Area C, N, D. Range 1.

Frequent in similar places to the preceding.

24. SINAPIS, *L.*

1. *S. arvensis*, L. Colonist. British type. Area C, N, D. Range 1, 2.

Everywhere common in cultivated fields and waste ground, ascending to 450 yards in Weardale and Allendale.

2. *S. alba*, L. Colonist. English type. Area C, N, D. Range 1.

Frequent in cultivated ground, ascending in Teesdale to Eglestone (700 feet). The commonest species on Holy Island (R. Embleton).

3. *S. nigra*, L. Colonist. English type. Area C, N, D. Range 1.

In similar stations to the two preceding, but less frequent.

4. *S. tenuifolia*, Br. Denizen. English type. Area N, D. Range 1.

Frequent upon embankments and by road-sides about Shields, Sunderland, Hartlepool, &c., but perhaps originally introduced with ballast.

25. RAPHANUS, *L.*

1. *R. raphanistrum*, L. Colonist. British type. Area C, N, D. Range 1, 2.

A common weed in cultivated ground, ascending to 350 yards in Weardale, and 450 yards in West Allendale. There are two forms, one with sulphur-coloured and the other with white flowers and violet veins, both frequent.

Order 7. RESEDACEÆ.

1. RESEDA, *L.*

1. *R. luteola*, L. Native. British type. Area C, N, D. Range 1.

Frequent upon dry banks and by road-sides in the low country, ascending Coquetdale to Rothbury, Weardale to Frosterley, and Teesdale to Eglestone (820 feet).

2. *R. lutea*, L. Native? English type. Area D. Range 1.

Frequent upon the coast-line, but probably native in Durham only, upon the Magnesian Limestone.

Order 8. CISTACEÆ.

1. HELIANTHEMUM, *Gaertn.*

1. *H. vulgare*, Gaertn. Native. Xerophilous. British type. Area C, N, D. Range 1–3.

In the Cheviot tract frequent amongst the lower hills about Mindrum, Wooler, and Alwinton, but not ascending to the peaks. Frequent everywhere upon the basalt and limestone, ascending to the Main Limestone scars of Burnhope (550 yards), Newbiggin Moor, Bleak Law, and Highfield (700 yards), and found occasionally upon the sand-hills of the coast-line, as at Holy Island. An excellent example of a widely-diffused xerophilous species.

Order 9. VIOLACEÆ.

1. VIOLA, *L.*

1. *V. palustris*, L. Native. British type. Area C, N, D. Range 1–3.

Frequent in damp grassy places, especially in the hilly tracts, ascending to 800 yards on Cheviot, 650 yards on Stangend Rigg, 600 yards on Highfield.

2. *V. odorata*, L. Native. English type. Area D. Range 1.

We claim this as a true native only for the denes of the Magnesian Limestone country. In Cheviot-land it is quite a rare plant, having been seen by Mr. Tate only in Hulne Woods and by Mr. Embleton near Ellingham. In Tyneland it is quite scattered, but in Durham more frequent, especially about Darlington, Middleton-one-Row, Stockton, and Yarm.

3. *V. hirta*, L. Native. Xerophilous. English type. Area C, N, D. Range 1.

Not unfrequent amongst the limestone and basalt, ascending in Teesdale to 300 yards, and occasionally found upon the coast links, as at Cullercoats and Tynemouth.

4. *V. sylvatica*, Fries. Native. British type. Area C, N, D. Range 1–3.

Common upon hedge-banks and in grassy places, ascending to 600 yards on Cheviot, 650 yards on Highfield. The subspecies *V. Reichenbachiana*, Jord., is abundant in Dinsdale Woods and no doubt elsewhere.

5. *V. canina*, L. Native. British type. Area N. Range 1.

The only specimens of this from our district which we have seen were gathered by Mrs. J. G. Baker upon the coast sand-hills between Hartley and Whitley, but it is very liable to be passed over for the preceding.

6. *V. arenaria*, D. C. Native. Local type. Area D. Range 2.

In Teesdale plentiful upon the Sugar Limestone of Widdy Bank Fell and westward north of the Weel. Elevation 500–550 yards. Discovered by James Backhouse and James Backhouse, jun., of York. In the type the leaves are hairy, but in our plant nearly naked.

7. *V. tricolor*, L. Colonist. British type. Area C, N, D. Range 1–2.

Common in cultivated fields, ascending to 850 feet in Teesdale, in Weardale above St. John's Chapel to 1000 feet.

8. *V. lutea*, Huds. Native. Scottish type. Area C, N, D. Range 1–3.

In the Cheviot tract frequent on the lower hills about Wooler and Alwinton, but not ascending to the peaks. Scattered over the moors north of the Tyne, common in the upper part of Allendale, Weardale, and Teesdale, ascending to the Main Limestone of Highfield, 650 yards, and frequent down as low as Sinderhope and Eglestone; sometimes carried lower by the streams.

Order 10. DROSERACEÆ.

1. DROSERA, *L.*

1. *D. rotundifolia*, L. Native. British type. Area C, N, D. Range 1, 2.

Common on swampy heaths, ascending to 600 yards on Cheviot, 550 yards at the head of the Beldon Burn (Derwent), and 500 yards in Teesdale. Probably a plant of the Upper zone, but we have not seen it there.

2. *D. anglica*, Huds. Native. Scottish type. Area N. Range 1.

Long known as a plant of Muckle Moss (150 yards) and Prestwick Carr, but doubtless now eradicated at the latter station. Wallis reports a *D. longifolia* from a bog on the north side of Slaterfield, near Simonburn, which may be this.

Order 11. POLYGALACEÆ.

1. POLYGALA, *L.*

1. *P. vulgaris*, L. Native. British type. Area C, N, D. Range 1, 2.

Frequent in grassy places, ascending to 550 yards in Dunsdale and Harwood Dale. The subspecies *P. depressa*, Wend., is frequent on heaths; and the variety *oxyptera* occurs in Coquetdale near Alwinton.

Order 12. CARYOPHYLLACEÆ.

1. DIANTHUS, *L.*

1. *D. deltoides*, L. Native. English type. Area C, N, D. Range 1.

About Wooler and Alwinton in several places on the porphyry, ascending to Windyhaugh, 250 yards, and frequent along the basalt from Gunnerton to Belford and Spindlestone. In Durham it is reported from the neighbourhood of Shotley Bridge by John Storey, and of Wolsingham by W. Backhouse.

2. *D. armeria*, L. Native. English type. Area D. Range 1.

On the moor above Shull near Wolsingham, springing up after the ling has been burnt (W. Backhouse). Probable altitude 200–250 yards.

2. SAPONARIA, *L.*

1. *S. officinalis*, L. Denizen. English type. Area C, N, D. Range 1.

On the mound of Wark Castle (W. Richardson!). Near the abbey at Hexham (Robertson). Found formerly by the Tyne at Gateshead, and occurring in several places about the lower part of the Wear and Tees. Castle Eden Dene (M. A. Lawson).

3. SILENE, *L.*

1. *S. inflata*, Sm. Native. British type. Area C, N, D. Range 1.

Frequent upon hedge-banks and by road-sides, ascending in South Tynedale to fields above Gatton (920 feet). The variety *puberula* is not uncommon.

2. *S. maritima*, With. Native. Submaritime. British type. Area C, N, D. Range 1, 2.

Frequent on rocks along the coast-line, and gathered in the Dunsdale ravine of Cheviot by Dr. F. Douglas.

3. *S. noctiflora*, L. Colonist. English type. Area C, N, D. Range 1.

Not unfrequent as a weed of cultivated fields. Berwick, Hetton, Howick, Embleton, Holy Island, Chollerford, Hartley, Preston, Gateshead, South Shields, Cleadon, Whitburn, Bishop Middleham, Castle Eden, &c.

4. LYCHNIS, *L.*

1. *L. flos-cuculi*, L. Native. British type. Area C, N, D. Range 1–3.

Frequent in ditches and damp fields, ascending to 550 yards on Cheviot and in East and West Allendale, to 650 yards on Highfield.

2. *L. diurna*, Sibth. Native. British type. Area C, N, D. Range 1, 2.

Common in woods and upon shaded hedge-banks, ascending to Falcon Clints (500 yards), and the Main Limestone scars of Harwood Dale (550 yards).

3. *L. vespertina*, Sibth. Native. British type. Area C, N, D. Range 1.

Frequent, principally in cultivated fields, ascending in Coquetdale above Rothbury (150 yards). The red-flowered variety near the Wansbeck at Morpeth, and by the road-side between Beal and the sea (B.).

4. *L. githago*, L. Colonist. British type. Area C, N, D.

Common in cultivated fields, ascending to 450 yards in East Allendale.

5. MOENCHIA, *Ehrh.*

1. *M. erecta*, Sm. Native. English type. Area C, D. Range 1.

In Northumberland on the basalt at Ratcheugh, Howick, Spindlestone, and Embleton. Gravel pits on Durham Moor

(Rev. J. Symons. F.), and gathered long ago near Sunderland by Weighell, but not seen in Durham recently.

6. SAGINA, *L.*

1. *S. procumbens*, L. Native. British type. Area C, N, D. Range 1–3.

Common upon walls and in damp places, ascending to 750 yards on Highfield, 890 yards on Cheviot. The pentamerous form is not unfrequent amongst the hills.

2. *S. maritima*, Don. Native. Maritime. British type. Area C, N, D. Range 1.

Frequent along the coast-line; Alnmouth, Howick, Bambro', Holy Island, Farne Islands, Dunstanbro', Blyth, Hartley, Willington, Hartlepool, Seaton Carew, &c.

3. *S. apetala*, L. Native. English type. Area C, N, D. Range 1.

Frequent in the low country in sandy soil. The highest station we know is the road-side near the Forest Lodge on Alnwick Moor (T.).

4. *S. ciliata*, Fries. English type. Area C, N. Range 1.

Bed of the Wooler Water from the Langlee-ford ravine down to the town with *Teesdalia* and *Glyceria rigida* (Jas. Hardy. B.) Near Bamborough (T.). On the coast sand-hills at High Pans near Blyth (R. B. Bowman!).

5. *S. subulata*, Wimm. Native. Scottish type. Area C. Range 1.

On the basalt at Ratcheugh, Howick, Spindlestone, Dunstanbro', Craster, &c. The Cullereoats plant mentioned by Ray, Syn., Ed. 2, p. 207, referred here by Winch, is more likely *S. maritima*. There is no specimen of it in Buddle's Herbarium, but he writes that he thinks the plant a var. of that now called *S. ciliata*.

6. *S. nodosa*, E. Meyer. Native. British type. Area C, N, D. Range 1–3.

In sandy ground liable to be inundated, found principally amongst the coast sand-hills or high up amongst the hills. It ascends to 350 yards in Welhope and Harwood Dale, and we have seen it with *Saxifraga stellaris* at 600 yards in West Allendale.

7. SPERGULA, *L.*

1. *S. arvensis*, L. Colonist. British type. Area C, N, D. Range 1.

A common weed in cultivated ground, ascending in Coquetdale above Alwinton (250 yards), and to 300 yards near Gatton.

8. HONCKENEJA, *Ehrh.*

1. *H. peploides*, Ehrh. Native. Maritime. British type. Area C, N, D. Range 1.

Common in sandy ground all along the coast-line.

9. SPERGULARIA, *Pers.*

1. *S. marina*, Camb. Native. Maritime. British type. Area C, N, D. Range 1.

All along the coast-line in muddy places; not so plentiful as the next.

2. *S. neglecta*, Syme. Native. Maritime. British type. Area C, N, D. Range 1.

Common all along the coast-line in damp places.

3. *S. rubra*, St. Hil. Native. British type. Area C, N, D. Range 1.

Sandy ground, somewhat local. Frequent about Wooler, Akeld, Ilderton, Roddam, &c. Alnwick Moor, Harbottle, Newcastle Town Moor, Gateshead Fell, Durham, &c. A maritime form is found on the coast occasionally, which must not be confounded with the preceding.

10. ARENARIA, *L.*

1. *A. serpyllifolia*, L. Native. British type. Area C, N, D. Range 1, 2.

Common on walls and in dry places, ascending in Teesdale to the Main Limestone scars of Newbiggin Moor (550 yards). The var. *leptoclados* is not unfrequent.

2. *A. verna*, L. Native. Xerophilous. Intermediate type. Area C, N, D. Range 1–3.

Absent from the Cheviot, and in the northern district known only on the basalt at Spindlestone (R. Embleton). Frequent throughout the lead country, ascending to 750 yards on Highfield and 600 yards above Allenheads, descending to the Tees at Middleton and the Tyne at Wylam.

3. *A. uliginosa*, Schl. Native. Local type. Area D. Range 2.

In Teesdale very sparingly beside the streamlet that runs from the Sugar Limestone of Widdy Bank Fell to the Weel, and more abundant in the swamp above Widdy Bank House with *Elyna* and *Juncus triglumis*, 500–550 yards.

4. *A. trinervis*, L. Native. British type. Area C, N, D. Range 1.

Frequent upon hedge-banks and in bushy places, ascending in Coquetdale above Rothbury and in Teesdale to High Force (980 feet).

11. STELLARIA, *L.*

1. *S. nemorum*, L. Native. Scottish type. Area C, N, D. Range 1, 2.

Damp and shaded woods, not unfrequent. By the Tweed at Wark, Cornhill, and Norham, the Aln in Hulne and Rugley Woods, the Coquet at Warkworth, the North Tyne at Simonburn, in the Derwent district at Cawsey and Ravensworth, ascending the Wear to Elm Ford west of St. John's Chapel (350 yards), descending to Chester-le-Street and Lambton Woods, ascending the Tees to Middleton-Teesdale, descending to Baydales.

2. *S. media*, With. Native. British type. Area C, N, D. Range 1–3.

Everywhere common in cultivated and waste ground, ascending on Highfield to 750 yards. Var. *neglecta* is frequent in woods and by stream sides, and var. *Boreana* grows on the basaltic dike at Gunnerton.

3. *S. holostea*, L. Native. British type. Area C, N, D. Range 1, 2.

Common upon hedge-banks and in woods, ascending to 500 yards in East Allendale, and 550 yards in Harwood Dale.

4. *S. glauca*, With. Native. English type. Area C, N, D. Range 1.

Rare in swamps. Margin of Newham and Spindlestone Loughs (Johnston. T.). Prestwick Carr (R. B. Bowman!). Morden Carr (Rev. A. M. Norman!). Rice Carr near Darlington (W. Backhouse!).

5. *S. graminea*, L. Native. British type. Area C, N, D. Range 1, 2.

Frequent in damp and shaded places, ascending to 550 yards in Welhope and 1700 feet in West Allendale.

6. *S. uliginosa*, Murr. Native. British type. Area C, N, D. Range 1–3.

Frequent in swampy spots, especially amongst the hills, ascending to 800 yards on Cheviot, 700 yards on Highfield, 600 yards in Welhope.

12. CERASTIUM, *L.*

1. *C. glomeratum*, Thuill. Native. British type. Area C, N, D. Range 1, 2.

Frequent in dry and grassy places, ascending to 400 yards in Burnhope, 350 yards in Teesdale.

2. *C. triviale*, Link. Native. British type. Area C, N, D. Range 1–3.

Everywhere common in grassy places, ascending to 800 yards

on Cheviot and 750 yards on Highfield. A subglabrous variety (*holostioides*, Fries,) grows near the Tyne above Redheugh, in Langdon Dale, &c.

3. *C. semidecandrum*, L. Native. British type. Area C, N, D. Range 1.

Frequent in sandy ground both along the coast and inland, ascending Coquetdale to Holystone. On the basaltic dike at Gunnerton and Kyloe. In the Wansbeck district very fine on walks near Hartburn Grange, 150 yards.

4. *C. tetrandrum*, Curt. Native. Maritime. British type. Area C, N, D. Range 1.

Frequent in sandy ground along the coast-line. *C. pumilum* is given as a plant of the province by Winch, but his specimens are a mixture of this and the preceding.

5. *C. arvense*, L. Native. Xerophilous. British type. Area C, N, D. Range 1.

Frequent on the Magnesian Limestone and occasionally upon the coast-links, and in dry sandy soil elsewhere. Banks of the Tweed at Norham. On the limestone at Ratcheugh. Not known in the porphyritic tract.

Order 13. LINACEÆ.

1. LINUM, *L.*

1. *L. usitatissimum*, L. Alien.

Occasionally cultivated and casually subspontaneous.

2. *L. perenne*, L. Native. Xerophilous. Germanic type. Area D. Range 1.

Dry places, almost confined to the Magnesian Limestone; Marsden, Tunstall Hill, dry banks between Coxhoe and Trimdon, by the Tees at Baydales, and in several places lower down about Middleton-one-Row and Yarm.

3. *L. catharticum*, L. Native. British type. Area C, N, D. Range 1, 2.

Common in dry grassy places, ascending to 600 yards in Harwood Dale and the Main Limestone scars of Kilhope and Newbiggin Moor, 550 yards.

Order 14. MALVACEÆ.

1. MALVA, *L.*

1. *M. moschata*, L. Native. British type. Area C, N, D. Range 1.

Not unfrequent by road-sides in dry sandy or calcareous soil, ascending in Weardale above Stanhope, 250 yards. Plentiful in the lower part of Tynedale about Hexham and Corbridge.

2. *M. sylvestris*, L. Native. British type. Area C, N, D. Range 1.

Common by road-sides and in waste ground in the country, ascending near Wooler to 150 yards.

3. *M. rotundifolia*, L. Native. English type. Area C, N, D. Range 1.

Frequent in similar places to the preceding.

Order 15. TILIACEÆ.

1. TILIA, *L.*

1. *T. intermedia*, D. C.

Is not unfrequent in hedge-rows and plantations. *T. grandifolia* and *parvifolia* may be seen occasionally.

Order 16. HYPERICACEÆ.

1. HYPERICUM, *L.*

1. *H. Androsæmum*, L. Native. English type. Area D. Range 1.

Planted in Hulne Woods. In Durham in a plantation at

Twinkham Lea near Seaton Carew (John Hogg); and at Birch Carr near Middleton-one-Row (W. Backhouse! F.).

2. *H. perforatum*, L. Native. British type. Area C, N, D. Range 1.

Common by road-sides and on the edge of fields, ascending in Teesdale to 800 feet. Var. *lineolatum* has been gathered in North Tynedale not far from Hexham by Mr. W. H. Brown.

3. *H. dubium*, Leers. Native. English type. Area C, N, D. Range 1.

Tweed bank near the Chain Bridge and other places near Berwick (Johnston). In Coquetdale below Rothbury, and by the river side near Alwinton (B.). In several places in the lower part of Tynedale, Teesdale, and Weardale, ascending above Stanhope and Middleton, 800 feet.

4. *H. quadrangulum*, L. Native. British type. Area C, N, D. Range 1, 2.

Frequent in ditches and swampy places, ascending to 350 yards in Harthope (Wear district), and to 400 yards in Teesdale west of the High Force.

5. *H. humifusum*, L. Native. British type. Area C, N, D. Range 1, 2.

Frequent on sandy banks, ascending in Teesdale to High Force Wood, 350 yards (W. Foggitt).

6. *H. pulchrum*, L. Native. British type. Area C, N, D. Range 1, 2.

Frequent on sandy heaths, ascending to 500 yards in the Dunsdale ravine of Cheviot, and nearly as high in Teesdale (Caldron Snout and Falcon Clints) and East Allendale.

7. *H. hirsutum*, L. Native. British type. Area C, N, D. Range 1, 2.

Frequent in woods and upon hedge-banks, especially on the

limestone, ascending Coquetdale to porphyritic cliffs at Windy-haugh (250 yards), and Weardale to the wood above the village of Wearhead (1150 feet).

8. *H. montanum*, L. Native. Xerophilous. English type. Area D. Range 1.

In several of the Magnesian Limestone denes, as Castle Eden, Dalton, Hawthorne, and Ryhope.

9. *H. calycinum*, L. Alien.

Planted near Cornhill (R. Embleton. A.); and at Hulne Abbey near Alnwick (T.). A native of Turkey.

Order 17. ACERACEÆ.

1. ACER, *L.*

1. *A. campestre*, L. Native. English type. Area D. Range 1.

Clearly native in the denes of the Magnesian Limestone, but doubtfully so north of the Tyne. It may be indigenous in the woods on the steep banks of the Wansbeck about Morpeth and Mitford, where there are trees by the stream side 30 to 40 feet high, but in Cheviot-land it seems evidently introduced.

2. *A. pseudo-platanus*, L. Alien.

Common in woods and hedge-rows, frequent in the low country, and one of the commonest trees about farm-houses in the dales, ascending in Harwood Dale to 1600 feet, and in East and West Allendale to 1650 feet. Winch regarded it as indigenous, and it is considered to be so by Mr. Carr, whose remarks on the subject will be found in the third volume of the Transactions, page 9.

Order 18. GERANIACEÆ.

1. ERODIUM, *L'Herit.*

1. *E. cicutarium*, Sm. Native. British type. Area C, N, D. Range 1.

Frequent in dry sandy soil, especially near the sea. Near Wooler at 350 feet.

2. GERANIUM, *L.*

1. *G. phæum*, L. Alien.

Twizell House Dene (Johnston). Mr. Cook's woods at Newton-on-the-Moor near Alnwick (J. Davison. F.). Tyne side near Bywell (R.). In Durham in Hardwick Dene (M. A. Lawson), and Lumley Woods near Chester-le-Street (G. T. Fox! F.). Indigenous in Holland and France.

2. *G. sylvaticum*, L. Native. Scottish type. Area C, N, D. Range 1, 2.

Frequent in woods and fields amongst the hills, descending to the denes of the Coal country and Magnesian Limestone. In the Dunsdale ravine of Cheviot at 1400 feet, in East Allendale at 1600 feet, in Teesdale as high as the Caldron Snout, and in Harwood Dale up to 550 yards, descending to Morpeth, Holywell Dene, Haydon Bridge, Staindrop, &c.

3. *G. pratense*, L. Native. British type. Area C, N, D. Range 1, 2.

Frequent in meadows and by the side of streams, ascending in Teesdale to Langdon Bridge (400 yards).

4. *G. pusillum*, L. Native. English type. Area C, N, D. Range 1.

Frequent upon hedge-banks and in cultivated fields, ascending in Weardale to Stanhope (700 feet).

5. *G. molle*, L. Native. British type. Area C, N, D. Range 1, 2.

Common in similar situations to the preceding, ascending in Rookhope (Wear district) to 500 yards. The station near Hexham assigned to *G. rotundifolium* in the Flora is no doubt a mistake.

6. *G. dissectum*, L. Native. British type. Area C, N, D. Range 1.

Frequent in similar places to the preceding two, ascending to

300 yards in Teesdale and Weardale, and rather higher in Allendale.

7. *G. columbinum*, L. Native. English type. Area N, D. Range 1.

On the basaltic dike at Walltown and Gunnerton, 150 yards (F. R!). Lane at Anick Grange near Hexham (F. Scott. F.). On the Magnesian Limestone on Cleadon Hill and at Coniscliffe (F!).

8. *G. lucidum*, L. Native. British type. Area C, N, D. Range 1, 2.

Scattered throughout the province, occurring principally in the dales. Wooler (Akeld Dene, Caldgate Mill, Humbledon Dene, all on the porphyry), Alwinton, Ratcheugh Crag, Barrasford, Stanhope, Cocken, Gainford, Upper Teesdale between Middleton and Langdon Bridge, 400 yards.

9. *G. Robertianum*, L. Native. British type. Area C, N, D. Range 1, 2.

Common in woods and on shaded banks, ascending to the high limestone scars of Harwood Dale and Welhope (550 yards).

10. *G. sanguineum*, L. Native. British type. Xerophilous. Area C, N, D. Range 1.

Frequent upon the coast links from Berwick to the Tees, inland known only upon the basalt at Ratcheugh, and in the lower part of Castle Eden Dene.

Order 19. BALSAMINACEÆ.

1. IMPATIENS, *L.*

1. *I. noli-me-tangere*, L. Alien.

Hulne Woods, now extinct (T.). Wood near the Muckle Moss (Miss Meredith, 1855). See note by Mr. Wailes, Trans., vol. II, p. 332.

Order 20. OXALIDACEÆ.

1. OXALIS, *L.*

1. *O. acetosella*, L. Native. British type. Area C, N, D. Range 1, 3.

Common in woods and on shaded banks, ascending to 700 yards on Cheviot, 600 yards in Welhope, 550 in Harwood Dale, 500 yards near the head of Knucton Burn (Derwent).

Division 2. CALYCIFLORÆ.

Order 1. CELASTRACEÆ.

1. STAPHYLEA, *L.*

1. *S. pinnata*, L. Alien.

Hulne Woods, Alnwick (R. Embleton. A.). Mainsforth near Ferryhill (T. Wood!).

2. EUONYMUS, *L.*

1. *E. europæus*, L. Native. English type. Area C, N, D. Range 1.

In the porphyritic tract on the banks of the College Burn (Johnston), and in Humbledon Dene (Rev. A. Baird). On the basalt at Ratcheugh, Belford, Kyloe, Spindlestone, &c. By the Wansbeck near Camboise (J. Storey!). In several of the Tyne denes as Teckct, Scotswood, and Heaton; and those of the Magnesian Limestone as Ryhope, Hesleden, and Castle Eden. Shipley Wood near Eglestone, 200 yards (Rev. J. Harriman. F.). In the Darlington lane a mile west of Norton (John Hogg).

Order 2. RHAMNACEÆ.

1. RHAMNUS, *L.*

1. *R. catharticus*, L. Native. English type. Area D. Range 1.

Very rare and not seen recently. Ryhope Dene (W. Weighell. F!). Lawson's Slack near Darlington (James Backhouse).

Order 3. LEGUMINOSÆ.

1. SPARTIUM, *L.*

1. *S. scoparium*, L. Native. British type. Area C, N, D. Range 1, 2.

Common on sandy heaths. It is apparently quite absent from the upper part of Teesdale and Weardale, but grows on the basaltic and porphyritic cliffs. The highest station measured was on the ridge between Wooler and the head of the Glen, 1260 feet.

2. ULEX, *L.*

1. *U. europæus*, L. Native. British type. Area C, N, D. Range 1, 2.

Common upon heaths and in waste uncultivated ground, ascending to 410 yards in Rookhope (Wear district), and 350 yards in the Cheviot tract. Not seen in Teesdale above the High Force, Weardale above Westgate, Allendale above Studden.

2. *U. Gallii*, Planch. Native. English type. Area C, N. Range 1.

In considerable plenty on Wooler Common, porphyry at 200–250 yards. Baron House Bog, near Gilsland; in several places in Tynedale; near Staward Peel, near Haydon Bridge, and on the basalt at Coley Hill near Heddon. *U. nanus* is reported in the Flora from Durham Moor (Rev. J. Symons), but the true *nanus* is restricted to the South of England.

3. GENISTA, *L.*

1. *G. tinctoria*, L. Native. English type. Area C, N, D. Range 1.

Frequent in grassy places, ascending to Whitsunbank Wood near Wooler (150 yards), and in North Tynedale to Nunwick. Rare in Cheviot-land.

2. *G. anglica*, L. Native. British type. Area C, N, D. Range 1.

Frequent on heaths, ascending to Gunnerton Crags, Alwinton, and Ross Castle Moor near Wooler, 300 yards.

4. ONONIS, *L.*

1. *O. arvensis*, L. Native. British type. Area C, N, D. Range 1, 2.

Frequent in sandy ground, especially on the coast links, ascending in Coquetdale above Rothbury, in Allendale to Allentown, 250 yards, and in Weardale on the moor north of St. John's Chapel to 400 yards.

2. *O. antiquorum*, L. Native. British type. Area C, N, D. Range 1.

In similar places to the preceding, but less frequent.

5. ANTHYLLIS, *L.*

1. *A. vulneraria*, L. Native. Xerophilous. British type. Area C, N, D. Range 1, 2.

Frequent along the coast links and amongst the limestone, ascending to the plateau of Widdy Bank Fell, 500 yards. Not ascending amongst the Cheviots, but growing amongst the porphyritic debris by the stream sides as at Branton and Wooler.

6. MEDICAGO, *L.*

1. *M. sativa*, L. Alien.

An occasional weed in cultivated fields.

2. *M. lupulina*, L. Native. British type. Area C, N, D. Range 1, 2.

Common in dry sandy ground and cultivated fields, ascending in Teesdale to Eglestone, 960 feet, and in the Wear district in Rookhope to 1300 feet.

3. *M. maculata*, Sibth. Native. English type. Area N. Range 1.

Sandy field near the Spital Dene, old windmill near Tynemouth Church (W. H. Brown!) Reported in the Flora from under the banqueting house at Alnwick (Miss Forster), but not seen in Cheviot-land lately.

7. MELILOTUS, *Lam.*

1. *M. officinalis*, Willd. Colonist. English type. Area C, N, D. Range 1.

Frequent in waste ground and on the borders of fields, ascending Coquetdale to Rothbury and Sharperton, 150 yards.

2. *M. vulgaris*, Willd. Alien.

Coupland plantations near Wooler (James Mitchell).

8. TRIFOLIUM, *L.*

1. *T. repens*, L. Native. British type. Area C, N, D. Range 1–3.

Everywhere common in grassy places, ascending to 650 yards on Stangend Rigg, 750 yards on Highfield.

2. *T. hybridum*, L. Alien.

Now quite replacing the preceding as a cultivated crop, and sometimes establishing itself by roadsides, &c.

3. *T. pratense*, L. Native. British type. Area C, N, D. Range 1–3.

Common in grassy places, ascending to 550 yards in East Allendale, and 650 yards in Harwood Dale. It is grown as a crop in Teesdale up to 400 yards.

4. *T. medium*, L. Native. British type. Area C, N, D. Range 1, 2.

Frequent in bushy and grassy places, especially amongst the hills, ascending Coquetdale to Windyhaugh, the Derwent to 1300 feet, and Harwood Dale to 500 yards.

5. *T. arvense*, L. Native. British type. Area C, N, D. Range 1.

Not unfrequent in dry sandy soil. In the bed of the streams on porphyritic debris at Branton, Wooler, &c. On the basalt at Gunnerton, Bambro', and Belford. Seen also at Holy Island, Holystone, Rothbury, Barrasford, Gateshead, Fulwell, Tunstall, Seaton Carew, &c. Not ascending above 200 yards.

6. *T. scabrum*, L. Native. English type. Area C, N, D. Range 1.

In similar situations to the preceding, rare. Holy Island, on the basalt (F. T.). On the coast sand-hills at Tynemouth (John Storey). In the paddock at Bishopwearmouth (W. Weighell. F.). Moor above the north sands, Hartlepool (Miss Wharton). Sandy grassy field near Tees Bay, Seaton Carew (John Hogg).

8. *T. striatum*, L. Native. English type. Area C, N, D. Range 1.

In similar places to last two, rare. On the basalt at Gunnerton, Kyloe, Dunstanbro', Norwich, Spindlestone, and Holy Island. By the Coquet between Harbottle and Rothbury (Professor Oliver). Reported in the Flora from Gateshead. On the Magnesian Limestone at Whitburn, Cleadon, Sunderland, and near Darlington.

8. *T. fragiferum*, L. Native. English type. Area C, N, D. Range 1.

In various places along the coast from the Tweed to the Tees amongst the sand-hills and by stream-sides. It is reported in the Flora from Halypike Lough, but if that means the little tarn of that name near Sewing Shields it is no doubt a mistake.

9. *T. procumbens*, L. Native. British type. Area C, N, D. Range 1.

Frequent in dry sandy soil, ascending Weardale to Frosterley, Teesdale above Middleton, 800 feet.

10. *T. agrarium*, L. Alien.

Seen once in a field of *T. hybridum* near Roddam (B.). This species has been seen lately in many parts of England in forage fields laid down with imported seed.

11. *T. minus*, Smith. Native. English type. Area C, N, D. Range 1.

Frequent in grassy and dry sandy places, ascending in Coquetdale to Linn Shiels, Allendale to Gatton Moor, Teesdale to Eglestone (300 yards).

12. *T. filiforme*, L. Native. English type. Area C, D. Range 1.

In similar places to the preceding, rare. Howick and Alnmouth (T.). On the Magnesian Limestone at Fulwell, Whitburn, Cleadon, and Castle Eden (F!). Sand-hills at Seaton Carew (Rev. F. J. A. Hort).

9. LOTUS, *L.*

1. *L. corniculatus*, L. Native. British type. Area C, N, D. Range 1, 2.

Everywhere common in grassy places, ascending to the high limestone scars of Harwood Dale, 550 yards, and as high in West Allendale. Var. *temus* is not uncommon in dry soil.

2. *L. major*, Scop. Native. British type. Area C, N, D. Range 1, 2.

Frequent in ditches and damp pastures, ascending to 350 yards in Dunsdale, and 400 yards near Cowshill in Weardale.

10. ASTRAGALUS, *L.*

1. *A. glycyphyllos*, L. Native. Germanic type. Xerophilous. Area C, N, D. Range 1.

Banks of Wooler Water near the Caldgate Mill, 150 yards (Johnston). Reported by Wallis from Cockle Hill near Learmouth, the mound of Wark Castle, and hilly pastures at Manylaws near Flodden. Wood near Earl (R. Embleton. A.). Sea

banks at Budle (Miss Forster). On the basaltic cliffs at Ratcheugh, Craster, Spindlestone, Bambro', &c. Warden Banks near Hexham, and by the Tyne above Ovingham (F.). By the Wear in Pelaw Wood near Durham (M. A. Lawson). By the Tees near the Abbey Bridge at Eglestone, and on the Magnesian Limestone above Darlington.

2. *A. hypoglottis*, L. Native. Xerophilous. Germanic type. Area C, N, D. Range 1.

Frequent along the coast sand-hills from the Tweed to the Tees. On the basalt at Ratcheugh near Alnwick, and on the Magnesian Limestone near West Boldon.

11. ORNITHOPUS, *L.*

1. *O. perpusillus*, L. Native. British type. Area D. Range 1.

Dry banks, gathered many years ago by Mr. Hogg near Urpeth, but not seen anywhere recently.

12. ONOBRYCHIS, *Gaertn.*

1. *O. sativa*, Lam. Native? Xerophilous. English type. Area D. Range 1.

Perhaps truly wild on the Magnesian Limestone cliff at Hartondown Hill, near Sunderland (F. James Backhouse). Grown occasionally as a forage crop.

13. VICIA, *L.*

1. *V. sylvatica*, L. Native. British type. Area C, N, D. Range 1.

Frequent in the woods of the hilly tracts and Magnesian Limestone. Tweed banks near Ord, Calish Woods near Alnwick, Roddam Dene, in Coquetdale near Rothbury, 150 yards, and Warkworth, in North Tynedale in Ramshaw and Tecket Denes and many other places about Hexham, and down the river to Newcastle, about Durham, Eglestone, Barnard Castle, &c.

2. *V. cracca*, L. Native. British type. Area C, N, D. Range 1, 2.

Frequent in meadows and hedges, ascending Teesdale to Langdon Bridge, 400 yards, and in the Derwent district, nearly to the source of the Knucton Burn, 466 yards.

3. *V. sativa*, L. Native. British type. Area C, N, D. Range 1, 2.

The typical plant is known in cultivation only, up to 300 yards in Teesdale, and 450 yards in Allendale. The var. *segetalis* is not unfrequent as a weed of cultivated ground, and the var. *Bobartii* is truly wild in grassy places.

4. *V. lathyroides*, L. Native. British type. Area C, N, D. Range 1.

Amongst the porphyritic debris by the stream-side at Alwinton, 150 yards (Prof. Oliver). On the basalt at Ratcheugh, Howick, Belford, Spindlestone, Holy Island, &c. Edge of fields near Cullercoats (R. B. Bowman !). Salt Meadows below Gateshead (F !). Near the Gaunless in Auckland Park (Miss Wharton). The plant gathered at Westoe was *V. Bobartii*.

5. *V. sepium*, L. Native. British type. Area C, N, D. Range 1, 2.

Common in grassy places, ascending to 350 yards in Dunsdale, 550 yards in Harwood Dale, and nearly as high in Allendale.

6. *V. hirsuta*, Koch. Colonist. British type. Area C, N, D. Range 1.

Common as a weed in cultivated ground.

7. *V. tetrasperma*, Koch. Colonist. English type. Area N, D. Range 1.

In similar situations to the last but less frequent, and not noted in Cheviot-land.

8. *V. monantha*, Koch. Alien.

Plentiful in a field of cultivated *V. sativa* at Allenheads, July, 1865 (B.).

14. LATHYRUS, *L.*

1. *L. pratensis*, L. Native. British type. Area C, N, D. Range 1, 2.

Common in hedge-rows and grassy places, ascending to 500 yards in Harwood Dale and East Allendale.

15. OROBUS, *L.*

1. *O. tuberosus*, L. Native. British type. Area C, N, D. Range 1, 2.

Common upon heaths and the borders of pastures, ascending to the high limestone scars of Harwood Dale, 550 yards. *O. niger* is not satisfactorily ascertained as a Cheviot-land plant.

Order 4. ROSACEÆ.

1. PRUNUS, *L.*

1. *P. spinosa*, L. Native. British type. Area C, N, D. Range 1.

The varieties *spinosa* and *insititia* common in hedge-rows and thickets, the former ascending to 400 yards at Moor Rigs in Teesdale, perhaps not native there, but no doubt truly so at 1150 feet in the wood above the village of Wearhead, on the porphyry about Alwinton, and on the basalt at Kyloe. Fine and plentiful in the woods about Hareshaw Linn. The var. *domestica* occurs as a straggler from cultivation only, and is grown in Allendale as high as 1700 feet.

2. *P. padus*, L. Native. Scottish type. Area C, N, D. Range 1, 2.

Frequent in woods and thickets, principally amongst the hills, ascending in Teesdale to Falcon Clints, 500 yards.

3. *P. avium*, L. Denizen. English type. Area C, N, D. Range 1, 2.

Not unfrequent in woods and by stream-sides, but doubtfully indigenous, ascending to 1100 feet in Rookhope (Wear district).

4. *P. cerasus*, L. Alien.

In plantations in several places near Embleton, but always planted (R. Embleton).

2. SPIRÆA, *L.*

1. *S. ulmaria*, L. Native. British type. Area C, N, D. Range 1, 2.

Common by stream-sides and in damp woods, ascending to 550 yards on Cheviot in Dunsdale, and as high in Harwood Dale.

2. *S. filipendula*, L. Native. Xerophilous. English type. Area C, N, D. Range 1.

On the basalt at Crag Close near Barrasford (T. R.); and at Spindlestone, plentiful in the plantations (W. Richardson. T.). On the Magnesian Limestone at Byers Quarry near Whitburn, and at Coniscliffe and Baydales near Darlington (F. R!).

3. *S. salicifolia*, L. Alien.

In several places in parks and plantations, as Hulne, Howick, Wallington, and Gibside.

3. GEUM, *Linn.*

1. *G. urbanum*, L. Native. British type. Area C, N, D. Range 1, 2.

Common in woods and on hedge-banks, ascending in Coquetdale to Harbottle, Weardale to Elm Ford Wood, 1150 feet, and Teesdale to 350 yards. This and the next frequently produce natural hybrids, like the primrose and cowslip.

2. *G. rivale*, L. Native. British type. Area C, N, D. Range 1–3.

Frequent in woods and damp places, ascending to 500 yards in East Allendale, 650 yards on Highfield.

4. AGRIMONIA, *L.*

1. *A. eupatoria*, L. Native. British type. Area C, N, D. Range 1.

Frequent on dry banks and in pastures, ascending Weardale above Stanhope to 250 yards. The var. *odorata* has been gathered by Professor Oliver and Mr. W. H. Brown in Simonburn Dene near Nunwick, and on Kyloe Crags; by the Rev. W. W. Newbould and Mr. J. G. Baker in the woods near Staward Peel (200 yards), and by the latter by the Coquet at Linn Shiels above Alwinton.

5. POTENTILLA, *L.*

1. *P. fruticosa*, L. Native. Intermediate type. Area D. Range 1, 2.

In Teesdale by the river side from Langdon Beck down to Middleton Bridge, plentiful in many places. Range of altitude 250–400 yards.

2. *P. anserina*, L. Native. British type. Area C, N, D. Range 1, 2.

Common by road-sides and on the edge of cultivated fields, ascending Coquetdale above Alwinton, Weardale above St. John's Chapel, 1100 feet, and Teesdale to Langdon Bridge, 400 yards.

3. *P. argentea*, L. Native. English type. Area N, D. Range 1.

In Tynedale at Beaufront, near Hexham (F. Scott), and near the mill at Corbridge (J. Adamson!) On the Magnesian Limestone cliffs between Shields and Sunderland (E. Robson. F!).

4. *P. alpestris*, Hall. Native. Highland type. Area C, D. Range 1, 2.

On the basaltic dike at Spindlestone, now nearly or quite extinct; specimens from this locality are referred to *P. verna* by Winch and Johnston, but seem to belong to the present species. In Teesdale sparingly on the the basalt at Falcon Clints and by the Tees side at Winch Bridge, 300-500 yards. The Tynedale plant placed here in the Flora is really *P. argentea.*

5. *P. reptans*, L. Native. British type. Area C, N, D. Range 1.

Frequent by road-sides and upon hedge-banks, ascending in Teesdale to Middleton, 300 yards, and in Coquetdale to Holystone.

6. *P. tormentilla*, Nesl. Native. British type. Area C, N, D. Range 1–3.

Common in heathy places at all levels, ascending to 850 yards on Cheviot, and 750 yards on Highfield. The var. *procumbens* is not uncommon.

7. *P. fragariastrum*, Ehrh. Native. British type. Area C, N, D. Range 1, 2.

Common upon grassy banks, ascending to 550 yards in Harwood Dale, 450 yards in East Allendale.

6. COMARUM, *L.*

1. *C. palustre*, L. Native. British type. Area C, N, D. Range 1–3.

Frequent on swampy heaths, ascending, with *Carex ampullacea*, to 500 yards in the swamps by the Weel, 600 yards in Coal Cleugh, 650 yards on Highfield.

7. FRAGARIA, *L.*

1. *F. vesca*, L. Native. British type. Area C, N. D. Range 1, 2.

Common in woods and on hedge-banks, ascending to 1400 feet

in the Cheviot ravines, 500 yards on Falcon Clints, and 550 yards in Harwood Dale. The Wallington *Fragaria*, reported in the Flora as *elatior*, is only a woodland form of this species. What is called the Simonburn Strawberry is a variety with white fruit, very deep green leaves, the central one cuneate at the base, which is figured in the Supplement to English Botany 2742, and is the *F. calycina* of Lindley but not of Loiseleur.

8. RUBUS, *L.*

1. *R. chamæmorus*, L. Native. Highland type. Area C, N, D. Range 2, 3.

Found on all the peaks which ascend into the Upper zone, but scarcely descending below 1500 feet. Abundant on Cheviot, Hedgehope, and the peaks at the head of Allendale, Weardale, and Teesdale. It is said to have been gathered on Simonside and the Deadwater Fell, at the head of North Tynedale.

2. *R. saxatilis*, L. Native. Xerophilous. Scottish type. Area C, N, D. Range 1, 2.

Frequent on damp cliffs and by the stream sides in the dales, in the Cheviot tract in Roddam Dene, the Langlee-ford ravine, and ascending to Harthope Linn and in Dunsdale to 500 yards. Calish Woods near Alnwick. On the basalt at Sewing Shields and Gunnerton. In the Wansbeck district at Hartburn Banks and near Wallington. Banks of the Irthing at Gilsland, and in many of the Tyne denes about Bellingham and Hexham. Nouns Wood near Butsfield. In the Wear District in Burnhope. In Teesdale in numerous places, ascending to 550 yards in Harwood Dale and down the river as far as Eglestone. Castle Eden Dene.

3. *R. idæus*, L. Native. British type. Area C, N, D. Range 1, 2.

Frequent in thickets, especially amongst the hills, ascending to 500 yards in the Brizzle, and to 330 yards in Harwood Dale.

4. *R. suberectus*, And. (including *plicatus*, W. and N.). Native. British type. Area C, N, D. Range 1, 2.

Twizell House Dene and copses on Kyloe Crags (Johnston). By the Coquet below Alwinton, and in a fir wood by the road-side between Alwinton Bridge and Harbottle, and again between the latter village and Holystone (B.). Near Rothley Lake (Sir W. C. Trevelyan. A.). In several places about Slealey and Corbridge Moor, also at Staward Peel and in the wood at the High Force above the highway, 350 yards (B.).

5. *R. Lindleianus*, Lees. Native. English type. Area F. Range 1.

In Tynedale in hedges between Dilston and Slealey (B.) In a hedge at Willington (W. Robertson!).

6. *R. cordifolius*, W. and N. Native. English type. Area C, N, D. Range 1.

By the side of the road on the hill south of Roddam. By the side of the road just out of Harbottle eastward. Corbridge Moor and in a lane near Bardon Mills. Thickets on the coast north of Whitley. In Weardale by the side of the road between Eastgate and Westgate, 250 yards (B.).

7. *R. discolor*, W. and N. Native. English type. Area C, N, D. Range 1.

In some districts the commonest form, but not ascending amongst the hills.

8. *R. leucostachys*, Sm. Native. English type. Area N. Range 1.

In South Tynedale by the road-side north of Fourstones Station and about Corbridge, and by way of Dilston up to Slealey, plentiful. Thickets amongst the coast sand-hills near Seaton Sluice (B.).

9. *R. umbrosus*, Arrh. Native. English type. Area C, N, D. Range 1.

Woods and thickets, frequent, ascending to 950 feet in

Allendale. It is to this that the plant marked *R. fruticosus* in Winch's collection belongs.

10. *R. macrophyllus*, W. and N. Native. English type. Area C, Range 1.

The typical plant seen only from West Buston near Alnwick (J. Chrisp!), and thickets by the road-side near Akeld and at the base of Yevering Bell (B.); the var. *amplificatus*, Lees, in the wood on the back of Kyloe Crags, 150 yards, and by the side of the road near Beal (B.).

11. *R. villicaulis*, W. and N. Native. English type. Area C, N, D. Range 1.

In the wood at Langlee-ford near Wooler, road-sides near Kyloe, in Tynedale about Dilston, Slealey, Bardon Mills, and the lead mines below Langley Castle, and in Weardale between Eastgate and Westgate, 250 yards (B.).

12. *R. calvatus*, Bloxam. Native. English type. Area N. Range 1.

In South Tynedale in thickets by the road-side south of Haydon Bridge (B.).

13. *R. radula*, W. and N. Native. English type. Area C, N, D. Range 1.

Frequent in hedges and thickets, ascending Allendale to 250 yards.

14. *R. rudis*, W. and N. Native. English type. Area C, N. Range 1.

In Coquetdale in a hedge by the road-side between Rothbury and Thropton. In South Tynedale near Langley Castle, 150 yards. Thickets near the mouth of Holywell Dene (B.).

15. *R. infestus*, W. and N. Native. English type. Area C, N, D. Range 1.

By the side of the road between Kyloe and the crags. In North Tynedale between Wark and Nunwick. In South

Tynedale plentiful about Dilston, Lennel, and Slealey, and by the side of the road between Gatton and Staward, 200 yards. In Weardale between Stanhope and Westgate (B.).

16. *R. Koehleri*, W. and N. (including *pallidus*, W. and N.) Native. English type. Area C, N, D. Range 1, 2.

The common woodland bramble and seen in hedges occasionally, ascending to 350 yards in Weardale, 960 feet in Teesdale, 250 yards in Allendale.

17. *R. diversifolius*, Lindl. Bab. Native. English type. Area C, N. Range 1.

Lane at West Buston near Alnwick (J. Chrisp!). By the railway side near Beal Station, in Coquetdale below Rothbury, in the lane between Morpeth and Long Horsley, in North Tynedale at Wark, 150 yards, in South Tynedale at Dilston, and in the dene of the Bardon Burn below Chesterholme (B.).

18. *R. corylifolius*, Sm. Native. English type. Area C, N, D. Range 1.

The common hedge-row bramble, ascending to 250 yards in Weardale, 800 feet in Teesdale, and 950 feet in Allendale.

19. *R. cæsius*, L. Native. English type. Area C, N, D. Range 1.

Common in hedges and thickets, ascending in Weardale above Stanhope, and in Teesdale above Middleton, 820 feet.

9. ROSA, *L.*

1. *R. cinnamomea*, L. Alien.

Hulne Woods near Alnwick (T.).

2. *R. spinosissima*, L. Native. British type. Area C, N, D. Range 1, 2.

Frequent along the coast links (var. *pusilla*, Woods), and inland in numerous localities, ascending both into the limestone and sandstone dales. Yevering Bell on porphyry and high up the Cheviot ravines, and in about Alwinton. On the basalt at

Kyloe, Ratcheugh, Howick, and Bambro'. In Teesdale on Falcon Clints and Force Garth scars, 500 yards.

3. *R. rubella*, Smith. Incognit.

All the specimens we have seen under this name belong to *spinosissima* except two, which are in Winch's collection in the Newcastle Museum, and are marked "Durham coast." The fruit here is bright red and drooping, in the preceding much stouter and rounder, deep purple in colour, and erect. Very likely there has been some mistake in regarding these two specimens as British, as the plant is not known elsewhere in the country.

4. *R. hibernica*, Smith. Native. Intermediate type. Area C, D.

In Weardale near Witton-le-Wear, and in Coquetdale in thickets near Flotterton, gathered in both stations by Professor Oliver. The Coquetdale plant (var. *cordifolia*, Baker,) differs from the type of the species by its setose peduncles and broader cordate leaves.

5. *R. Sabini*, Woods. Native. English type. Area N, D. Range 1.

Banks of the Wansbeck near Sheepwash (John Storey!). In Tynedale near Shield Hall in the hedges near where the road from Dilston to Slealey divides from that which leads to Allendale (B.). Wood between Pipewellgate and the Redheugh, near Gateshead (W. Robertson). Road-side between Hylton and Washington (Professor Oliver!). Hedge near Sedgefield (Rev. A. M. Norman!). Near Darlington at Baydales, in Birch Carr, and by the side of the Stockton and Darlington road near Middleton-one-Row (W. Backhouse. B.). Hedges between Yarm and Stockton (W. Robertson!). Var. *Robertsoni*, Baker, still grows in the upper part of Heaton Dene.

6. *R. mollissima*, Fries.! *R. mollis*, Smith! *R. villosa*, Linn. herb! Native. British type. Area C, N, D. Range 1, 2.

Common in hedges and thickets, ascending to 400 yards in

Teesdale, and 450 yards in Allendale. Var. *cærulea*, Woods, in thickets in the Seaton Delaval avenue, and an extreme form with perfectly smooth peduncles in thickets by the side of the road south of Haydon Bridge (B.).

7. *R. tomentosa*, Smith. Native. British type. Area C, N, D. Range 1, 2.

Common in hedges and thickets, ascending to 350 yards in Glendale, 450 yards in East Allendale, and in Teesdale to Falcon Clints 1450 feet, and the high limestone scars of Harwood Dale 550 yards. Var. *scabriuscula*, Winch, is not unfrequent, and a form with leaves very glandular beneath, approaching *R. britannica*, Deseglise, gathered by Mr. Robertson on the side of the Roman wall between Carville and Byker Hall, and by Mr. Baker by the side of the road between Earl and Caldgate Mill.

8. *R. Borreri*, Woods. *R. inodora* Auct. Angl. non., Fries. Native. English type. Area C, N, D. Range 1.

Bank of the Wooler Water below the town and hedges between Wooler and Yevering, gathered originally by Dr. Johnston, seen by Messrs. Hardy and Baker in 1866. Ravensworth Woods and hedge at Spring Gardens near Newcastle (W. Robertson!).

9. *R. rubiginosa*, L. Denizen. English type. Area C, N, D. Range 1.

Not unfrequent in hedges, but perhaps not truly wild. Scremerston, Wooler, South Middleton, Lilburn, Bambro', Alnwick, Embleton, Warkworth, Chollerford, Dilston, Gateshead, Westoe, Sunderland, Raby, Seaton Carew, &c.

10. *R. canina*, L. Native. British type. Area C, N, D. Range 1, 2.

Everywhere common in hedges and thickets, ascending in Teesdale to 1450 feet. Vars. *lutetiana*, *dumalis*, *urbica*, and *dumetorum* are common. Var. *cordifolia* gathered at Mason Dinnington by Robertson, var. *Watsoni* at Prestwick Carr by Robertson, var. *Crepiniana* in thickets at Chesterholme, var. *celerata* in Holywell Dene, vars. *pruinosa*, *arvatica*, and *subcristata* in several

places, var. *Blondeana* in Coquetdale near Tosson on the slope of Simonside, var. *cæsia* in thickets near Caldgate Mill, and a form of var. *tormentella* with glandular peduncles by the side of the Wooler Water below the town.

11. *R. arvensis*, Huds. Native. English type. Area C, N, D. Range 1.

Between the Broom House and Haggerstone (Thompson). Between Cold Harbour and Fallodon West Farm (R. Embleton). Elswick Dene near Newcastle (F.). In Durham in woods and thickets at Gateshead, Cocken, Washington, Marsden, Ryhope, and Norton (F. R!).

10. SANGUISORBA, *L.*

1. *S. officinalis*, L. Native. Intermediate type. Area N, D. Range 1, 2.

Frequent in the two southern divisions in damp grassy places, ascending in Teesdale to 1400 feet on Falcon Clints.

11. POTERIUM, *L.*

1. *P. sanguisorba*, L. Native. Xerophilous. English type. Area C, N, D. Range 1.

Frequent upon the limestone and basalt, and occasionally amongst the coast sand-hills, as near Tynemouth.

12. ALCHEMILLA, *L.*

1. *A. vulgaris*, L. Native. British type. Area C, N, D. Range 1–3.

Frequent in grassy places, ascending to 500 yards on Cheviot, 750 yards on Highfield.

2. *A. arvensis*, Lam. Native? British type. Area C, N, D. Range 1.

Common in cultivated fields, especially on a sandy soil, ascending to 300 yards in Teesdale. On the basalt at Gunnerton with *Draba verna* and *Cerastium semidecandrum*.

13. CRATÆGUS, *L.*

1. *C. oxyacantha*, L. Native. British type. Area C, N, D. Range 1, 2.

Everywhere common in hedges and thickets. Not seen above 350 yards amongst the Cheviots, but ascending to 550 yards in East and West Allendale, and nearly as high in Harwood Dale. The only variety truly wild in the province is *monogyna*, Jacq.

14. PYRUS, *L.*

1. *P. communis*, L. Alien.

To be seen sometimes in hedge-rows, as between Scots' Gap Station and Hartburn, but with no claim to be considered truly wild.

2. *P. malus*, L. Native. English type. Area C, N, D. Range 1, 2.

Common in hedge-rows and thickets, ascending both in Teesdale and the Wear district to 1100 feet.

3. *P. aria*, Sm. Native. Xerophilous. English type. Area D. Range 1.

Truly wild in the bed of the Tees at Winch Bridge, 300 yards, in small quantity (var. *rupicola*, Syme), and reported also from Castle Eden Dene. The typical form is to be seen occasionally in hedge-rows and plantations.

4. *P. aucuparia*, Gaertn. Native. British type. Area C, N, D. Range 1, 2.

Frequent in woods, ascending to 500 yards in the Cheviot ravines, 550 yards on the limestone scars of Harwood Dale.

Order 5. ONAGRACEÆ.

1. EPILOBIUM, *L.*

1. *E. angustifolium*, L. Native. British type. Area C, N, D. Range 1, 2.

Banks of nearly all the hill streams. On the Cheviot near

Langlee-ford, banks of Common Burn, Hethpool Linn, and lower part of Henhole. By the Coquet about Shillmoor and Alwinton. On the basalt at Crag Lake and near Barrington. Hareshaw Linn, Knaresdale, by the Allen at Pryhill and Peckriding near Allentown, and by the Derwent near Edmundbyers and Blanchland. In numerous places in Weardale and Teesdale, ascending to Falcon Clints and Langdon Dale scars, 500 yards, descending to Barnard Castle.

2. *E. hirsutum*, L. Native. English type. Area C, N, D. Range 1.

Frequent in the low country in ditches and by stream sides, ascending Coquetdale to Sharperton, Weardale to Frosterley and Teesdale, 200 yards.

3. *E. parviflorum*, Schreb. Native. British type. Area C, N, D. Range 1, 2.

Common in similar situations to the preceding, ascending in Weardale to Copthill, 400 yards, in Teesdale to the High Force, 350 yards.

4. *E. montanum*, L. Native. British type. Area C, N, D. Range 1, 2.

Common by stream-sides and on shaded banks, ascending to the high limestone scars of Harwood Dale, 550 yards, and as high in East Allendale.

5. *E. roseum*, Schreb. Alien.

A weed in garden ground, Darlington (W. Backhouse !). Doubtless will be found truly wild in the province eventually, as it is not unfrequent in North Yorkshire.

6. *E. palustre*, L. Native. British type. Area C, N, D. Range 1, 2.

Common in ditches and swampy places, ascending to 600 yards in West Allendale, 500 yards in the Derwent district.

7. *E. obscurum*, Schreb. Native. British type. Area C, N, D. Range 1, 2.

Frequent in ditches and swamps, ascending on Cheviot to 550 yards, and nearly as high on the moors at the head of East Allendale. We have not seen the true *E. tetragonum* within the province.

8. *E. anagallidifolium*, Lam. Native. Highland type. Area C, D.

On Cheviot near the top of Henhole and Goldscleugh (Dr. F. Douglas. T.). In Teesdale on the moor near the Caldron Snout (Sir W. C. Trevelyan. F!). Probable altitude 500–600 yards.

9. *E. alsinifolium*, Vill. Native. Highland type. Area C, D.

Abundant in all the high Cheviot sykes. In the Wear district in the streams that issue from the Main Limestone in Welhope, and in the Tees district sparingly on Highfield above Grasshill. Range of altitude 500–850 yards.

2. CIRCÆA, *L.*

1. *C. lutetiana*, L. Native. British type. Area C, N, D. Range 1.

Frequent in woods, ascending in North Tynedale to Tecket and Hareshaw Denes, 200 yards. We have not seen the true *C. alpina* from the province. Winch's specimen thus named is *C. lutetiana* only, but *C. intermedia*, Ehrh., was gathered by Mr. Storey near Ryton.

Order 6. HALORAGACEÆ.

1. HIPPURIS, *L.*

1. *H. vulgaris*, L. Native. British type. Area C, N, D. Range 1.

Ponds and slow streams, not unfrequent. Near Lucker and in Learmouth Bog (T.). Newham Bog (R. Embleton). Ditch above Fleatham Bridge (W. Richardson). In the Reed Water

below Otterburn, 150 yards (Professor Oliver and Brown.) In the Blyth below Bedlington (W. H. Brown). Prestwick Carr (F. R!). Hell Kettles near Croft (B.). In the Skerne at Darlington (W. Backhouse). In the stells about Norton (J. Hogg).

2. MYRIOPHYLLUM, *L.*

1. *M. verticillatum*, L. Native. English type. Area N, D. Range 1.

In a pond at Walker near Newcastle (R. B. Bowman. A.). In a pond at Polam near Darlington (W. Backhouse. F.).

2. *M. spicatum*, L. Native. British type. Area C, N, D. Range 1.

Frequent in ditches and slow streams, ascending Coquetdale to Rothbury, 150 yards.

3. *M. alterniflorum*, D. C. Native. British type. Area C, N. Range 1.

Heathy ponds. Shipley near Alnwick (John Storey!). Prestwick Carr and Crag Lake, 250 yards (R!). In the Chirdon Burn near Bellingham (W. H. Brown!) Easily passed over as the preceding.

3. CERATOPHYLLUM, *L.*

1. *C. demersum*, L. Native. English type. Area D. Range 1.

Ditches on Durham Moor (Rev. J. Symons. F.).

4. CALLITRICHE, *L.*

1. *C. verna*, L. Native. British type. Area C, N, D. Range 1, 2.

Everywhere common in ditches and ponds, ascending to 500 yards in Allendale.

2. *C. platycarpa*, Kutz. Native. British type. Area C, N, D. Range 1, 2.

Frequent in swamps and on the edges of ponds, ascending to 1700 feet in West Allendale.

3. *C. pedunculata*, D. C. Native. British type. Area C, N, D. Range 1, 2.

Frequent in ponds and ditches, ascending in Teesdale to the Weel, 500 yards.

4. *C. autumnalis*, L. Native. Scottish type. Area C, N, Range 1.

We have seen specimens of the true plant only from Prestwick Carr, 250 feet, where it is very likely now destroyed (B.), and above Powburn near the Breamish (T.).

Order 7. LYTHRACEÆ.

1. LYTHRUM, *L.*

1. *L. salicaria*, L. Native. English type. Area C, N, D. Range 1.

Ditches and stream-sides, not unfrequent in the low country.

2. PEPLIS, *L.*

1. *P. portula*, L. Native. British type. Area N, D. Range 1.

Heathy swamps. Prestwick Carr, Kibblesworth, &c.

Order 8. CUCURBITACEÆ.

1. BRYONIA, *L.*

1. *B. dioica*, L. Native. English type. Area N, D. Range 1.

Found formerly at Rugley near Alnwick, but not indigenous (R. Embleton). In Tynedale in the Haugh Lane near Hexham (R. Wigham!). Not uncommon in the south-east of Durham about Bishop Auckland, Darlington, Hartlepool, and Stockton.

Order 9. PORTULACEÆ.

1. MONTIA, *L.*

1. *M. fontana*, L. Native. British type. Area C, N, D. Range 1–3.

Frequent in swamps and streamlets, especially amongst the

hills, ascending to 800 yards on Cheviot, 550 yards in Welhope. Var. *rivularis* is frequent in the hill sykes.

Order 10. SCLERANTHACEÆ.

1. SCLERANTHUS, *L.*

1. *S. annuus*, L. Native. British type. Area C, N, D. Range 1.

Frequent in dry sandy soil, ascending on porphyry above Alwinton to 300 yards, and nearly as high on the banks of Common Burn near Wooler. *S. perennis* of Winch's Flora is no doubt a mistake for this.

Order 11. GROSSULARIACEÆ.

1. RIBES, *L.*

1. *R. nigrum*, L. Denizen. Intermediate type. Area C, N, D. Range 1.

Not unfrequent by stream-sides, but very doubtfully indigenous. The most wild-looking station we have seen is in Tecket Dene, 150 yards.

2. *R. rubrum*, L. Native. Intermediate type. Area N, D. Range 1, 2.

The typical plant doubtfully indigenous like the preceding. Var. *petræum* in Tynedale near Warden, Haydon Bridge, and some of the denes nearer Newcastle, and in Teesdale from Moor Rigs, 400 yards, down to Conisclifle.

3. *R. alpinum*, L. Denizen. Intermediate type. Area C, N, D. Range 1.

Woods, doubtfully indigenous. Ratcheugh, Denwick, Hulne, Felton, Wallington, Sunderland, Chester-le-Street, and by the Tees above Darlington.

4. *R. grossularia*, L. Denizen. Intermediate type. Area C, N, D. Range 1.

Frequent in hedge-rows and by stream-sides. Perhaps indigenous in Hesleden Dene, where it grows on the limestone cliff (W. H. Brown).

Order 12. CRASSULACEÆ.

1. SEDUM, *L.*

1. *S. rhodiola*, D. C. Native. Highland type. Area C. Range 2.

Sparingly low down in Henhole, at an elevation of about 400 yards (James Hardy. T.).

2. *S. telephium*, L. Native. English type. Area C, N, D. Range 1, 2.

Walls of Hulne Abbey and plantation near Greensfield (T.). Near Belsay (Miss Trevelyan. F.). Banks between Nunwick and Simonburn (Wallis). Hedge-banks near Hexham, and by the Tyne below Paradise (F.). Wood at Butterby and by the mill at Shincliffe (John Hogg. F.). Hedges near Durham and Lanchester, and by the road-side near Urpeth Mill (F!). Var. *purpureum*, Tausch., in Teesdale on Falcon Clints, 500 yards, and on the rocks in High Force Wood (B.).

3. *S. villosum*, L. Native. Highland type. Area C, N, D. Range 1, 2.

Scattered amongst the Cheviots, descending with the Wooler Water to Earl, and the Coquet to Alwinton and Rothbury. On the basaltic dike at Great Bavington, Spindlestone, and Bambro'. Gathered by John Thompson near Haltwhistle. In the Allendale district in Coal Cleugh, in the Wear district in Irishope, Welhope, and Swinhope, in Teesdale fine above Widdy Bank House and in many other places. Range of elevation from 100 feet to 550 yards.

4. *S. anglicum*, Huds. Native. Atlantic type. Area C. Range 1.

On the Heugh and near the castle on Holy Island on basalt.

5. *S. album*, L. Alien.

Old walks at Ilderton and Embleton (T.). Walls at Hexham (W. Robertson). On the abbey bridge below Barnard Castle (E. Robson. F.).

6. *S. acre*, L. Native. British type. Area C, N, D. Range 1.

Frequent on dry banks and walls, ascending Teesdale to Newbiggin, 300 yards, and to the basaltic rocks at Gunnerton.

7. *S. reflexum*, *S. rupestre*, and *Sempervivum tectorum* are all three not unfrequently to be seen on roofs and old walls, but have no claim to be considered indigenous.

Order 13. SAXIFRAGACEÆ.

1. SAXIFRAGA, *L.*

1. *S. umbrosa*, and *S. geum*, L.

Are to be seen occasionally in a half-wild condition where they have strayed from parks or old gardens.

2. *S. stellaris*, L. Native. Highland type. Area C, N, D. Range 1–3.

Plentiful by the side of some of the Cheviot sykes, ascending to 850 yards on Cheviot itself (T.), descending to the Careburn near Earl, 150 yards, and in the Coquet district to the banks of the Usway Burn below Usway Ford. In the Allen district both in Coal Cleugh and on Kilhope Law, and in the Derwent district near Riddlehamhope, and on the banks of the Beldon Burn. In the Wear district by the streams that issue from the Main Limestone of Welhope and Irishope. In the Tees district in many places, from Widdy Bank Fell and 750 yards on Highfield eastward to Eglestone Moor and the High Force.

3. *S. hirculus*, L. Native. Intermediate type. Area D. Range 2.

In two places in the Wear district in Irishope, one three and the other five miles distant from St. John's Chapel (James Backhouse). Estimated altitude 400-500 yards.

4. *S. aizoides*, L. Native. Highland type. Area N, D. Range 1, 2.

Not known amongst the Cheviots. Banks of the Irthing near Gilsland, where it was first noticed by Wallis, a very low station (about 150 yards) for so thoroughly montane a plant when it is not known higher up the river. In Teesdale fine and plentiful on the banks of the Widdy Bank streamlets and carried down the river to the High Force. Range of altitude 150-500 yards. The station of Cawsey Dene, reported in the New Botanists' Guide, is no doubt a mistake.

5. *S. granulata*, L. Native. British type. Area C, N, D. Range 1, 2.

Dry sandy banks and cliffs of limestone and basalt, frequent, ascending from the coast links to 500 yards in the Cheviot denes.

6. *S. tridactylites*, L. Native. British type. Area C, N, D. Range 1.

Frequent on walls and rocks, ascending in Teesdale to Newbiggin, 300 yards.

7. *S. hypnoides*, L. Native. Scottish type. Area C, D. Range 2, 3.

Plentiful in Henhole, Goldscleugh, and the Brizzle, descending to Fleethope. In the Tees district on the peak of Highfield, and abundant on Falcon Clints. Range of altitude 200–750 yards.

1. CHRYSOSPLENIUM, *L.*

1. *C. oppositifolium*, L. Native. British type. Area C, N, D. Range 1–3.

Common in damp woods and about the hill streams, ascending

to 800 yards on Cheviot, 550 yards in Welhope, and 1000 feet in East Allendale.

2. *C. alternifolium*, L. Native. British type. Area C, N, D. Range 1, 2.

In similar situations to the preceding but less frequent, ascending to 500 yards in the Brizzle (James Hardy).

3. PARNASSIA, *L.*

1. *P. palustris*, L. Native. Scottish type. Area C, N, D. Range 1, 2.

Damp places near the sea and upland bogs. Frequent in the Magnesian Limestone denes. On the links at Holy Island, Alnmouth, Beadnell, &c. Ascending to 550 yards on Cheviot and in Welhope, to 500 yards on Widdy Bank, and nearly as high in Allendale and the Derwent district.

Order 14. ARALIACEÆ.

1. ADOXA, *L.*

1. *A. moschatellina*, L. Native. British type. Area C, N, D.

Frequent in woods, ascending in North Tynedale to Hareshaw Dene, 200 yards, and the British huts of Yevering Bell and Homilheugh.

2. HEDERA, *L.*

1. *H. helix*, L. Native. British type. Area C, N, D. Range 1, 2.

Common on hedge-banks, rocks, and trees, ascending to the porphyritic crags of Yevering Bell and Coquetdale, and to 400 yards on the limestone scars of Langdon Dale and Weardale.

Order 15. CORNACEÆ.

1. CORNUS, *L.*

1. *C. sanguinea*, L. Native. English type. Area D. Range 1.

Truly wild in the Magnesian Limestone denes, and probably

also in hedges in the south-east of Durham, but apparently planted only north of the Tyne.

2. *C. suecica*, L. Native. Highland type. Area C. Range 2.

On Cheviot in a hollow facing Wooler Common between the head of the Glen and Wooler Water, and found also by the Rev. J. F. Bigge on Rimside Moor. Estimated altitude 300–500 yards.

Order 16. UMBELLIFERÆ.

1. HYDROCOTYLE, *L.*

1. *H. vulgaris*, L. Native. British type. Area C, N, D. Range 1.

Frequent in swampy places, especially amongst the hills, ascending to 650 feet on Wooler Common.

2. SANICULA, *L.*

1. *S. europæa*, L. Native. British type. Area C, N, D. Range 1.

Frequent in woods and on shaded hedge-banks, ascending in North Tynedale to Tecket Dene, 150 yards.

3. ERYNGIUM, *L.*

1. *E. maritimum*, L. Native. Maritime. British type. Area D. Range 1.

Has been gathered in various places along the Durham coast, as near South Shields, Hartlepool, Castle Eden, and Seaton Carew, but not seen recently.

4. CONIUM, *L.*

1. *C. maculatum*, L. Native. British type. Area C, N, D. Range 1.

Frequent in ditches and waste ground, ascending Coquetdale to Linn Shiels and Allendale to Allentown, 250 yards.

5. SMYRNIUM, *L.*

1. *S. olusatrum*, L. Denizen. English type. Area N, D.

Reported from Dunstanbro', probably in error for *Ligusticum*. On the rocks below Tynemouth Castle, first noted there by Wallis and still holding its ground. Behind the town walls above the Close Gate, Newcastle (F!). Willington Dene (W. H. Brown). In the church-yard at Hurworth (Rev. J. Harriman! F.). Below the church in Hesleden Dene (M. A. Lawson).

6. CICUTA, *L.*

1. *C. virosa*, L. Native. English type. Area C. Range 1.

Learmouth Bog, and a single specimen found in 1840 on Charlton Moor (R. Embleton!) Ditches at Ewart near Wooler (T.). Reported by Wallis from the bank of the North Tyne at Low Park End near Nunwick.

7. APIUM, *L.*

1. *A. graveolens*, L. Native. Maritime. English type. Area C, N, D. Range 1.

Frequent in the marshes and about the mouth of the streams all along the coast.

8. PETROSELINUM, *Hoffm.*

1. *P. sativum*, Hoffm. Alien.

Old walls, introduced. Hulne Abbey, Barnard Castle, and on the Magnesian Limestone rocks at Tunstall and Coniscliffe.

9. HELOSCIADIUM, *Koch.*

1. *H. nodiflorum*, Koch. Native. English type. Area C, N, D. Range 1.

Frequent in ditches and slow streams in the low country, ascending in the Cheviot tract to Earl, and in North Tynedale to Barrasford, 100 yards.

2. *H. inundatum*, Koch. Native. British type. Area C, N, D. Range 1.

Moory swamps, not unfrequent, ascending to Gateshead Fell, 150 yards.

10. ÆGOPODIUM, *L.*

1. *Æ. podagraria*, L. Native. British type. Area C, N, D. Range 1, 2.

Stream-sides and road-sides, frequent, ascending to 450 yards in East Allendale, 350 yards in Teesdale, and nearly as high in Weardale.

11. SISON, *L.*

1. *S. amomum*, L. Incognit.

On a gravelly bank by the road on the south-east side of the bridge at Barrasford, and also in the lane between the Edge House and Chollerton Road (Wallis).

12. CARUM, *L.*

1. *C. carui*, L. Alien.

Occasionally introduced. Abundant in waste ground about Shorngate House near Allenheads, 1865 (B.). Corn-fields near Beamish (Winch).

13. SIUM, *L.*

1. *S. latifolium*, L. Native. English type. Area C. Range 1.

Ditches near Embleton and Beadnell (R. Embleton). Formerly found at Friars Goose near Gateshead, but the pond where it grew was drained long ago.

2. *S. angustifolium*, L. Native. English type. Area C, N, D. Range 1.

Not unfrequent in ditches and slow streams in the low country.

14. BUNIUM, *L.*

1. *B. flexuosum*, With. Native. British type. Area C, N, D. Range 1–3.

Everywhere common in grassy places, ascending to 650 yards

on Highfield, 550 yards in both East and West Allendale, 350 yards in Dunsdale.

15. PIMPINELLA, *L.*

1. *P. saxifraga*, L. Native. British type. Area C, N, D. Range 1, 2.

Frequent on dry banks, ascending from the coast-links to Falcon Clints, 500 yards, and the Main Limestone scars of Burnhope, 550 yards.

2. *P. magna*, L. Native. English type. Area N, D. Range 1.

About the Wansbeck at Morpeth and Sheepwash (John Storey. B.). In North Tynedale at Long Rigg and Barrasford, discovered by Wallis, gathered by the Club, 1858. In Durham in several places on the Magnesian Limestone about Sunderland and Hartlepool.

16. BUPLEURUM, *L.*

1. *B. tenuissimum*, L. Native. Maritime. English type. Area D. Range 1.

On the sea-banks about the mouth of the Tees (F. R!).

2. *B. rotundifolium*, L. Colonist. Germanic type. Area D. Range 1.

Corn-fields to the north and west of Norton and about Carlton and Redmarshal (John Hogg. F. R.). Corn-field adjoining the Common, Hartlepool (M. A. Lawson).

17. ŒNANTHE, *L.*

1. *Œ. fistulosa*, L. Native. English type. Area C, N, D. Range 1.

Ponds in the low country, not unfrequent.

2. *Œ. Lachenalii*, Gmel. Native. English type. Area C, N, D. Range 1.

Not unfrequent in salt marshes along the coast. Warren

Mills, Alnmouth, Howick, Embleton, Newton-by-the-Sea, Swinhoe, Warkworth, Willington, Southwick, Hylton, Hartlepool, Seaton Carew. The plants called *peucedanifolia* and *pimpinelloides* in Winch's Flora both belong here.

3. *Œ. crocata*, L. Native. British type. Area C, N, D. Range 1.

Frequent on the banks of streams in the low country, ascending North Tynedale to Barrasford, Weardale to Frosterley, 150 yards.

4. *Œ. phellandrium*, Lam. Native. English type. Area N, D. Range 1.

Prestwick Carr (F. R!). In a large pond at Walker at the foot of the ballast hill (R. B. Bowman!). Ponds near Cocken and Durham (F.). In a swamp near Bear Park (Rev. J. Symons. F.). Fine in Morden Carr in the ditches.

18. ÆTHUSA, *L.*

1. *Æ. cynapium*, L. Colonist. British type. Area C, N, D. Range 1.

Common in cultivated fields, ascending in Weardale to Frosterley, 200 yards.

19. LIGUSTICUM, *L.*

1. *L. scoticum*, L. Native. Maritime. Scottish type. Area C. Range 1.

On the beach a quarter of a mile south of Bambro' Castle (Sir W. C. Trevelyan!). Amongst the rocks on the north side of Dunstanbro' Castle, now eradicated (R. Embleton!).

20. SILAUS, *Besser.*

1. *S. pratensis*, Bess. Native. English type. Area C, N, D. Range 1.

Frequent in grassy places in the low country, ascending to 150 yards at Lowick.

21. MEUM, *Tourn.*

1. *M. athamanticum*, Jacq. Native. Scottish type. Area N. Range 1.

On the basaltic ridge a quarter of a mile north of the village of Throckington, recorded by Wallis, gathered lately by Mr. Makepeace. Estimated altitude, 150 yards.

22. ANGELICA, *L.*

1. *A. sylvestris*, L. Native. British type. Area C, N, D. Range 1, 2.

Common by stream-sides and in damp woods, ascending to 500 yards in the Cheviot ravines and as high in Allendale. The plant recorded in the Flora as *A. archangelica*, L., is this only.

23. PEUCEDANUM, *Linn.*

1. *P. ostruthium*, Koch. Alien.

About some of the dale farm-houses, apparently planted to use as a cow medicine. Bleakhope farm on the Breamish (Professor Oliver and W. H. Brown!). In Weardale on the banks of Daddre Burn below Daddre Shield (F.). Sparingly in Welhope. Abundant near a farm-house at 1600 feet not far from the head of Harwood Dale, also at Langdon Bridge (B.).

24. PASTINACA, *L.*

1. *P. sativa*, L. Denizen. English type. Area D. Range 1.

A common ballast plant all along the coast, but probably indigenous on the Magnesian Limestone, as at Tunstall near Sunderland.

25. HERACLEUM, *L.*

1. *H. sphondylium*, L. Native. British type. Area C, N, D. Range 1, 2.

Common in woods and meadows, ascending to 600 yards in Kilhope, 550 in Harwood Dale and East Allendale, 350 yards in

Goldscleugh. Var. *angustifolium* near Denwick (T.), and a form with narrow leaves and oblong fruit in the wood above Haydon Bridge (B.).

26. DAUCUS, *L.*

1. *D. carota*, L. Native. British type. Area C, N, D. Range 1.

Dry sandy fields and banks, not unfrequent, ascending to 1000 feet in Rookhope in a cultivated field. Truly wild about the Frosterley lime-quarries at 200 yards, and ascending Coquetdale to Sharperton.

27. CAUCALIS, *L.*

1. *C. daucoides*, L. Colonist. Germanic type. Area D. Range 1.

Cultivated fields bordering the lane between the village of Fulwell and the sea (F. R!). Clayey corn-fields half a mile north of Norton (John Hogg. F.). Fields near Whitburn (B. G.). Near the Old Park Lodge, Bishop Auckland (Miss Wharton).

28. TORILIS, *Adans.*

1. *T. anthriscus*, Gaertn. Native. British type. Area C, N, D. Range 1, 2.

Hedge-banks and dry ground, frequent, ascending in Teesdale to High Force Wood, 980 feet, in Rookhope to 1100 feet, in Coquetdale to Alwinton.

2. *T. nodosa*, Gaertn. Native. English type. Area C, N, D. Range 1.

Frequent in sandy fields and the foot of walls along the coast, associated usually with *Anthriscus vulgaris*.

29. SCANDIX, *L.*

1. *S. pecten-veneris*, L. Colonist. British type. Area C, N, D.

Common in cultivated fields, ascending in Teesdale to the High

Force, 350 yards, and in Weardale to St. John's Chapel, 950 feet.

30. ANTHRISCUS, *Hoffm.*

1. *A. vulgaris*, Pers. Native. British type. Area C, N, D. Range 1.

Sandy ground, frequent all along the coast.

1. *A. cerefolium*, Hoffm. Alien.

Casually subspontaneous. Hexham, Gateshead, &c.

3. *A. sylvestris*, Hoffm. Native. British type. Area C, N, D. Range 1–3.

Common everywhere in grassy places, ascending to 650 yards on Highfield, 550 yards in East Allendale. A form with deep green nearly naked leaves with narrow divisions, on limestone scars in Harwood Dale (B.).

31. CHÆROPHYLLUM, *L.*

1. *C. temulum*, L. Native. British type. Area C, N, D. Range 1.

Thickets and hedge-banks, common, ascending to 250 yards in Teesdale, and in Weardale to Stanhope.

32. MYRRHIS, *Scop.*

1. *M. odorata*, Scop. Native. Intermediate type. Area C, N, D. Range 1, 2.

Rare in Cheviot-land. Road-side near Cornhill (Dr. Johnston). Road-side near Lilburn (James Hardy). In Coquetdale at Holystone (B.). Banks of the Aln below Denwick Bridge, and of the Coquet opposite Warkworth Hermitage. Common by stream-sides in Tyneland and Durham, ascending in East Allendale to 550 yards, in Teesdale to Langdon Bridge, 400 yards.

Division 3. COROLLIFLORÆ.

Order 1. CAPRIFOLIACEÆ.

1. SAMBUCUS, *L.*

1. *S. nigra*, L. Native. British type. Area C, N, D. Range 1.

Common in woods and hedges, ascending in East Allendale to 300 yards.

2. *S. ebulus*, L. Denizen. English type. Area C, N, D. Range 1.

On the west side of the church-yard wall at Chatton (Wallis). Bambro', and on an old dike at Ingram (Sir W. C. Trevelyan): gathered recently at the latter station by W. Richardson. Holy Island (T.). Lane behind the church at North Sunderland (R. Embleton). In Tynedale at Purley Green (Wallis); and at the Crooks near Mumps Hall (John Thompson). In several places near Newcastle, as near Benwell, Felling, and between Stella and Blaydon (F. R!). Shincliffe Vale, and between Pelaw Wood and Old Durham (Miss Wharton). Tees bank between Yarm and Worsall (B.).

2. VIBURNUM, *L.*

1. *V. opulus*, L. Native. British type. Area C, N, D. Range 1, 2.

Common in hedges and thickets, ascending in Teesdale to 350 yards.

2. *V. lantana*, L. Alien.

Hedge-row by the high road near Shilbottle (T.). Chipchase Woods, North Tynedale (B.). Hell Kettles near Croft (W. Foggitt). Hedge near Sedgefield (Rev. A. M. Norman).

3. LONICERA, *L.*

1. *L. periclymenum*, L. Native. British type. Area C, N, D. Range 1, 2.

Common in woods and hedge-rows, ascending in Teesdale to Falcon Clints, 500 yards.

2. *L. xylosteum*, L. Alien.

Occasionally subspontaneous in plantations, as at Alnwick, Warkworth, Wallington, Durham, &c.

4. LINNÆA, *Gronov.*

1. *L. borealis*, Gron. Native? Scottish type. Area N. Range 1.

In a plantation of *Pinus sylvestris* at Catcherside, near Scots' Gap Station, possibly introduced, as it grows very sparingly in one corner of the wood only, and the trees were imported direct from Norway by Sir W. Blackett about 1770. It was planted by Mr. Selby in the dene near Twizell House, and has become established. Altitude about 200 yards.

Order 2. RUBIACEÆ.

1. GALIUM, *L.*

1. *G. verum*, L. Native. British type. Area C, N, D. Range 1, 2.

Common on dry grassy banks, ascending to 350 yards in Goldscleugh, to 450 yards in East Allendale, and to the Main Limestone scars of Kilhope, Welhope, and Newbiggin Moor, 550 yards.

2. *G. palustre*, L. Native. British type. Area C, N, D. Range 1–3.

Frequent upon the edges of ponds and on damp moors, ascending to 550 yards on Cheviot, 600 yards in Coal Cleugh, and 650 yards on Highfield. Var. *elongatum* is not unfrequent in swamps in the low country, and ascends Coquetdale to Rothbury.

3. *G. cruciatum*, With. Native. British type. Area C, N, D. Range 1, 2.

Frequent upon hedge-banks and the edge of fields, ascending in Teesdale to 400 yards, and nearly as high in Rookhope.

4. *G. uliginosum*, L. Native. British type. Area C, N, D. Range 1, 2.

Frequent in damp places, especially amongst the moors, ascending in Welhope to 550 yards.

5. *G. saxatile*, L. Native. British type. Area C, N, D. Range 1–3.

Frequent in heathy places, ascending the peaks of all the higher hills, Cheviot, 850 yards, Highfield, Kilhope Law, &c.

6. *G. mollugo*, L. Native. English type. Area C, N, D. Range 1.

Hedge-rows and thickets, very rare in Cheviot-land, more frequent in Tyneland and Durham. Very fine about Hexham, Wark, Nunwick, &c., ascending to 200 yards at Staward Peel.

7. *G. sylvestre*, Poll. Native. Xerophilous. Intermediate type. Area C, D. Range 1, 2.

Not observed yet in the neighbourhood of Wooler, but plentiful on the porphyry at Windyhaugh and Alwinton. In the Wear district sparingly on the Main Limestone scars of Burnhope, and more abundant in Kilhope. Common in Harwood Dale, ascending to the Upper Limestone of Bleak Law. Range of altitude, 150–550 yards.

8. *G. tricorne*, With. Colonist. Germanic type. Area C, D. Range 1.

Barley-field near Beal Station, 1866 (B.). On the Magnesian Limestone not uncommon about Marsden, Cleadon, Fulwell, &c. Corn-fields near Seaton Carew (W. Backhouse. F!). Corn-field west of the railway at Greatham (M. A. Lawson).

9. *G. aparine*, L. Native. British type. Area C, N, D. Range 1, 2.

Common in hedges and cultivated fields, ascending to 350 yards in Teesdale, and as high in Rookhope.

10. *G. boreale*, L. Native. Highland type. Area C, N, D. Range 1, 2.

By the Tweed side near Cornhill (R. Embleton). Not known amongst the Cheviots. Banks of the Tyne at Tarset, Bellingham, Nunwick, Hexham, Wylam, Bywell, &c.; and of the Irthing at Wardrew. Common by the Tees, beginning at the Caldron Snout, 500 yards, and carried down to Darlington and Yarm.

2. SHERARDIA, *L.*

1. *S. arvensis*, L. Colonist. British type. Area C, N, D. Range 1.

Frequent in cultivated fields, ascending to 850 feet in Teesdale.

3. ASPERULA, *L.*

1. *A. odorata*, L. Native. British type. Area C, N, D. Range 1, 2.

Frequent in woods, ascending in Teesdale to High Force Wood, 980 feet, and in the Wear district to Elm Ford near St. John's Chapel, 350 yards.

Order 3. VALERIANACEÆ.

1. CENTRANTHUS, *D. C.*

1. *C. ruber*, D. C. Alien.

Sometimes on old walls, as at Hulne Abbey.

2. VALERIANA, *L.*

1. *V. officinalis*, L. Native. British type. Area C, N, D. Range 1, 2.

Stream-sides and ditches, common, ascending to 450 yards in the Cheviot ravines, to 1600 feet in Harwood Dale.

2. *V. dioica*, L. Native. English type. Area C, N, D. Range 1–3.

Frequent in damp grassy places, ascending near Grasshill in Harwood Dale to 650 yards.

3. FEDIA, *Vahl.*

1. *F. olitoria*, Vahl. Native. British type. Area C, N, D. Range 1.

Hedge-banks and cultivated fields, frequent.

2. *F. dentata*, Bieb. Colonist. English type. Area C, N, D. Range 1.

Frequent in cultivated fields, ascending to 150 yards at Lilburn near Wooler.

Order 4. DIPSACEÆ.

1. DIPSACUS, *L.*

1. *D. sylvestris*, L. Native. English type. Area C, N, D. Range 1.

Dry sandy soil in the low country, not unfrequent.

2. SCABIOSA. *L.*

1. *S. succisa*, L. Native. British type. Area C, N, D. Range 1, 2.

Everywhere common in grassy places, ascending to 550 yards in Harwood Dale, nearly as high in East Allendale, and to 1400 feet in the Cheviot ravines.

2. *S. columbaria*, L. Native. Xerophilous. English type. Area C, N, D. Range 1, 2.

Not known amongst the porphyry of the Cheviot, and in the northern subprovince known only upon the basalt, as at Ratcheugh and Spindlestone, and the coast links. In Tyneland and Durham frequent on the limestone, ascending to the Main Limestone scars of Harwood Dale and Newbiggin Moor, 550 yards.

3. KNAUTIA, *Coult.*

1. *K. arvensis*, Coult. Native. British type. Area C, N, Range 1.

Dry banks and on the borders of cultivated fields, common, ascending to 300 yards in Teesdale and East Allendale.

Order 5. COMPOSITÆ.

1. TRAGOPOGON, *L.*

1. *T. pratensis*, L. Native. British type. Area C, N, D. Range 1, 2.

Frequent in grassy places, ascending Coquetdale to Alwinton, Teesdale to Middleton, and to 1100 feet in Rookhope. Var. *minor*, Fries. is more frequent than the type.

2. *T. porrifolius*, L. Alien.

A single specimen in waste ground near Beal Station, 1851 (T.).

2. HELMINTHIA, *Juss.*

1. *H. echioides*, Gaertn. Native. English type. Area C, D. Range 1.

On the sea-banks at Howick and Amble (W. Richardson). Not unfrequent upon the Magnesian Limestone, and about Sedgefield and Stockton.

3. PICRIS, *L.*

1. *P. hieracioides*, L. Native. English type. Area D. Range 1.

Shull near Wolsingham, 150 yards, and Baydales near Darlington (W. Backhouse!). At the lower end of Hawthorn Dene (F.). Near Norton (John Hogg. F.).

4. THRINCIA, *Roth.*

1. *T. hirta*, D. C. Native. English type. Area N, D. Range 1.

Sandy ground along the coast-line. Seaton Delaval, Blyth, Cullercoats, Tynemouth, Hartlepool, &c.

5. APARGIA, *Schreb.*

1. *A. hispida*, Willd. Native. English type. Area C, N, D. Range 1–3.

Common in grassy places, ascending to 350 yards in Goldscleugh, 650 yards in Harwood Dale near Grasshill.

2. *A. autumnalis*, Willd. Native. British type. Area C, N, D. Range 1–3.

Common in grassy places, ascending to 550 yards on Cheviot, 650 yards on Highfield, and nearly as high in Welhope and East Allendale.

6. HYPOCHŒRIS, *L.*

1. *H. radicata*, L. Native. British type. Area C, N, D. Range 1, 2.

Frequent on dry banks and grassy places, ascending to 450 yards in East Allendale.

7. LACTUCA, *L.*

1. *L. virosa*, L. Native. Germanic type. Area C, N, D. Range 1.

Dry banks, not unfrequent. Banks of the Tweed above Coldstream Bridge and below Norham; also near the toll-bar at Twizell (Johnston. T.). Banks of the Coquet at Warkworth (W. Richardson!). Near Cullercoats (F.). Scattered over the Magnesian Limestone and Red Sandstone tract from Cleadon to Pierce Bridge and Stockton. By the Tees on the bank beneath the castle at Barnard Castle, 150 yards (F.)

2. *L. muralis*, Less. Native. English type. Area N, D. Range 1.

Not unfrequent in Tynedale and Durham on shaded rocks and walls, especially in the Magnesian Limestone denes, ascending Weardale to Hamsterley, 150 yards (Professor Oliver).

8. SONCHUS, *L.*

1. *S. arvensis*, L. Colonist. British type. Area C, N, D. Range 1.

Common in cultivated fields, ascending in Allendale to Studden, 300 yards, and to 1000 feet in Rookhope.

2. *S. asper*, Hoffm. Native. British type. Area C, N, D. Range 1, 2.

Common in waste ground and by road-sides, ascending to 1100 feet in Rookhope, and in Weardale to Copthill, 1300 feet.

3. *S. oleraceus*, L. Native. British type. Area C, N, D. Range 1.

In similar situations to the preceding, ascending in Weardale to Stanhope, 250 yards.

9. CREPIS, *L.*

1. *C. virens*, L. Native. British type. Area C, N, D. Range 1.

Hedge-banks and cultivated fields, frequent, ascending in Coquetdale to Alwinton, Weardale to Stanhope, and Teesdale to Middleton, 250 yards. *C. biennis* is given by Winch as a plant of the province, but his specimens are in part *C. virens*, and in part (those from ballast) *Barkhausia taraxacifolia*.

2. *C. succisæfolia*, Tausch. Native. Intermediate type. Area C, N, D. Range 1, 2.

Not unfrequent in the hill denes. Amongst the Cheviots in Roddam Dene (James Hardy), and on the banks of the Common Burn (T. B.). Dene near Kyloe (R. Embleton). Near Alnwick in Rugley and White House Woods (T.). In Coquetdale near Alwinton and Rothbury (Professor Oliver). In North Tynedale near Smalesmouth (Professor Oliver!), in Tecket Dene (B.), and Hareshaw Dene (John Thompson). Thickets near Kirkwhelpington (W. Borrer). In South Tynedale in Cockton Wood near Chesterholme (John Thompson!). In the Wear district in Rookhope near Bolt's Burn, 1100 feet, and plentiful in

Burnhope and woods near St. John's Chapel, 400 yards (B.). In Teesdale from Langdon Dale by the Tees side down to Winch Bridge (B.).

3. *C. paludosa*, Mœnch. Native. Scottish type. Area C, N, D. Range 1–3.

Plentiful by the stream-sides and in damp woods amongst the hills, ascending from the Magnesian Limestone denes to 550 yards in Dunsdale, Cheviot, and as high both in East and West Allendale, and to 650 yards on Highfield near Grasshill.

10. HIERACIUM, *L.*

1. *H. pilosella*, L. Native. British type. Area C, N, D. Range 1–3.

Everywhere common in grassy places, ascending to the Main Limestone scars of Welhope, 550 yards, and Highfield, 650 yards.

2. *H. aurantiacum*, L. Alien.

Hulne Woods near Alnwick (T.).

3. *H. anglicum*, Fries. Native. Highland type. Area D. Range 1, 2.

In Teesdale sparingly from Falcon Clints down to Winch Bridge, 300–450 yards (B.). We see no valid reason for dropping Smith's name of *H. Lawsoni* for this species.

4. *H. iricum*, Fries. Native. Highland type. Area D. Range 1, 2.

In Teesdale with the preceding from Langdon Bridge and Falcon Clints by the river-side down to Winch Bridge, 300–450 yards.

5. *H. argenteum*, Fries. Native. Highland type. Area C. Range 1, 2.

In several places amongst the Cheviots on porphyritic crags. Abundant at Heathpool Linn (James Hardy and J. G. Baker), and gathered by Professor Oliver and Mr. W. H. Brown high

up in the Brizzle ravine and also by the Coquet near Shillmoor, where it was regathered by Mr. Baker in 1866. Range of altitude 100–500 yards.

6. *H. pallidum*, Biv. Native. Highland type. Area C, N, D. Range 1, 2.

On Cheviot high up in the Brizzle (Professor Oliver. W. H. Brown. B.). On the basalt at Kyloe and Spindlestone (W. Richardson!). On the Magnesian Limestone at Tunstall Hill near Sunderland (W. H. Brown!). In Teesdale on the basalt at Falcon Clints and Winch Bridge. There is a specimen in the Newcastle Museum collection from the neighbourhood of Gilsland. Range of elevation 150–500 yards.

7. *H. lasiophyllum*, Koch. Native. Highland type. Area C. Range 1.

By the Coquet in the porphyritic ravine at Linn Shiels, 2 miles above Alwinton. Discovered by Professor Oliver and Mr. W. H. Brown and regathered by Mr. Baker in 1866. Altitude 200–250 yards.

8. *H. murorum*, L., Fries.! Native. British type. Area C, N, D. Range 1, 2.

Not unfrequent on rocks, especially of limestone, in the denes, ascending from Castle Eden Dene to 600 yards in Dunsdale (B.), and as high in the Brizzle (Professor Oliver and W. H. Brown!).

9. *H. cæsium*, Fries. Native. Scottish type. Area C, D. Range 1, 2.

On porphyritic cliffs at Usway Ford near Alwinton (B.). On the basaltic dike at Kyloe (W. Richardson!). In Teesdale on limestone at Langdon Bridge (B.). Range of altitude 150–400 yards.

10. *H. vulgatum*, Fries. Native. British type. Area C, N, D. Range 1–3.

Frequent upon walls and rocks, and in woods, ascending to 600 yards on Cheviot, and in the Tees district to the Main Limestone of Highfield, 700 yards.

11. *H. gothicum*, Fries. Native. Highland type. Area C, N, D. Range 1, 2.

In Coquetdale in the ravine at Linn Shiels (B.). In North Tynedale near Smalesmouth (Professor Oliver and W. H. Brown!). In South Tynedale in a small ravine near Thorngrafton, first gathered by John Thompson. In the Wear district in Burnhope Woods, and by the Wear side above St. John's Chapel (B.). In Teesdale from the Caldron Snout and Langdon Bridge down to Winch Bridge (B.). Range of altitude 150–500 yards.

12. *H. tridentatum*, Fries. Native. British type. Area N, D. Range 1, 2.

In South Tynedale in the woods on the edge of the road on Corbridge Fell and higher up near Shield Hall (B.). In the Wear district in the wood at the bottom of Burnhope, and by the waterfall of the Harthope stream close to St. John's Chapel (B.). In Teesdale sparingly in High Force Wood (B.). Range of altitude 200–400 yards.

13. *H. prenanthoides*, Vill. Native. Highland type. Area C, N. Range 1.

In the Cheviot tract on the banks of the Common Burn, 150 yards (T. B.), and cliffs near Bleakhope on the Breamish (Professor Oliver and W. H. Brown!). In the Coquet district near Rothbury (W. Boyd). In North Tynedale in Tecket Dene (Professor Oliver and W. H. Brown). Banks of the Allen near its junction with the Tyne, first gathered by John Thompson.

14. *H. umbellatum*, L. Native. British type. Area C, N, D. Range 1.

Frequent in woods and thickets, ascending in North Tynedale to Smalesmouth, 200 yards (Professor Oliver and W. H. Brown!).

15. *H. crocatum*, Fries. Native. Highland type. Area C, N, D. Range 1, 2.

Plentiful at Heathpool Linn, both the narrow and broad-leaved varieties (James Hardy and J. G. Baker). In North Tynedale

near Smalesmouth (Professor Oliver and W. H. Brown !). Plentiful by the Wear side both above and below St. John's Chapel, and in Teesdale from Moor Rigs down to the High Force and Winch Bridge (B.). Range of altitude 100–400 yards.

16. *H. corymbosum*, Fries. Native. Montane. Highland type. Area C, N, D. Range 1, 2.

In Coquetdale in the ravine at Linn Shiels (B.). In North Tynedale by the stream-side at Tarset (Professor Oliver and W. H. Brown !). Abundant by the Tees from Langdon Bridge down to Winch Bridge. Range of altitude 150–400 yards.

17. *H. boreale*, Fries. Native. British type. Area C, N, D. Range 1, 2.

Frequent upon hedge-banks and in woods, ascending in Allendale to Sinderhope, 350 yards, and in Weardale and Teesdale to 400 yards. Very plentiful on some of the railway embankments near Newcastle.

11. BARKHAUSIA, *Moench.*

1. *B. setosa*, D. C. Alien.

Ratcheugh near Alnwick, introduced with clover seed.

12. TARAXACUM, *Juss.*

1. *T. officinale*, Wigg. Native. British type. Area C, N, D. Range 1–3.

Everywhere common in waste and grassy places, ascending to 550 yards on Cheviot, 650 yards on Stangend Rigg, 750 yards on Highfield. Var. *palustre* is frequent in swamps, especially amongst the hills. Var. *lævigatum* grows on the Magnesian Limestone in Hesleden Dene and on the sand-links at Alnmouth (T.).

13. LAPSANA, *L.*

1. *L. communis*, L. Native. British type. Area C, N, D. Range 1, 2.

Frequent upon hedge-banks and in cultivated fields, ascending

in Teesdale to High Force Wood, 350 yards, and in East Allendale to 450 yards.

14. CICHORIUM, *L.*

1. *C. intybus*, L. Colonist. English type. Area C, N, D. Range 1.

Not unfrequent as a weed in cultivated fields. Berwick, Twizell Castle, Alnwick, Linden, Belsay, Willington, Howdon, Snipperley, Sunderland, Murton House, Wynyard, Norton, &c.

15. ARCTIUM, *L.*

1. *A. lappa*, L. Native. British type. Area C, N, D. Range 1.

A. minus, Schk., is frequent by the road-sides and in waste ground, ascending in Teesdale to High Force, in East Allendale to Studden, 300 yards. *A. intermedium*, Bab., occurs in South Tynedale at Staward Peel and Haydon Bridge. We have not seen *A. majus*, Schk. from the province.

16. SERRATULA, *L.*

1. *S. tinctoria*, L. Native. English type. Area C, N, D. Range 1.

Very rare in Northumberland. On the coast between Craster and Howick, sparingly (T.). In South Tynedale at West Dipton near Hexham (R. Wigham). On the Magnesian Limestone at Cleadon, Whitburn, and on the cliffs at Marsden. Hedge-banks near Hylton Ferry (F.). In Castle Eden Dene and a lane leading from Cold Knuckles to Brereton (M. A. Lawson). Near Norton (John Hogg). In the Wear district at Hamsterley (W. Backhouse). By the Tees side at Winch Bridge, 300 yards (B.).

17. CARDUUS, *L.*

1. *C. nutans*, L. Native. English type. Area C, N, D. Range 1.

Frequent in waste ground, especially on the Magnesian Limestone, ascending to 150 yards at Roddam. A hybrid between

this species and the next was gathered by Mr. Baker in 1866 at North Middleton near Wooler, in a field where they grew intermixed. The stem was about three feet high, the leaves similar to those of *C. nutans* but the spines rather feebler, the heads three to five in a cluster, mostly on distinct stalks but casually two together, two-thirds the size of ordinary *C. nutans*, and the outer phyllaries not more than half as broad and hardly at all reflexed. This form is about midway between *C. nutans* and the Continental *C. acanthoides*, differing from the former about as much as the latter does from *C. crispus*.

2. *C. crispus*, L. Native. British type. Area C, N, D. Range 1.

Frequent in waste ground, ascending Weardale to Frosterley, and Coquetdale to Linn Shiels, 150 yards.

3. *C. tenuiflorus*, Curt. Native. Maritime. English type. Area C, N, D. Range 1.

Frequent in waste ground all along the coast-line.

4. *C. marianus*, D. Denizen. English type. Area C, N, D. Range 1.

On the rocks at Bambro' Castle and near the priory on Holy Island (F. T.). Willington Dene and Close Houses near Ovingham (F.). On the Priory Hill at Tynemouth, where it was noted by Wallis, and grows there still. Hartlepool and banks of the Wear at Durham (F.). Gathered also by W. Backhouse at Houghton-le-Skerne and J. Hogg near Norton.

5. *C. lanceolatus*, L. Native. British type. Area C, N, D. Range 1, 2.

Common everywhere in waste ground, ascending to the Main Limestone scars of Kilhope, Welhope, and Highfield, 600 yards.

6. *C. eriophorus*, L. Native. Xerophilous. English type. Area D. Range 1.

Recorded by Wallis from under the hill near the church at Wallsend. Rare on the Magnesian Limestone. In the lane near

the quarry at Fulwell (F.). Between Pittington Hallgarth and Elemore (James Backhouse. F.). Railway bank north of Hartlepool (M. A. Lawson).

7. *C. palustris*, L. Native. British type. Area C, N, D. Range 1, 2.

Common in damp fields, ascending to 550 yards on Cheviot, 600 yards on Highfield.

8. *C. arvensis*, Curt. Native. British type. Area C, N, D. Range 1–3.

Common in fields and waste ground, ascending to 600 yards above Allenheads, to 2000 feet on Highfield: a peculiar form, with broad flat leaves pinnatifid half-way down, gathered by John Storey at Newburn.

9. *C. heterophyllus*, L. Native. Scottish type. Area C, N, D. Range 1, 2.

Hilly woods, frequent. In the Cheviot district in the Brizzle, Goldscleugh, Glanton, and on Heathpool Bell and banks of the Wooler Water. In the Aln district near Kyloe, Ellingham, and in Rugley and White House Woods and Twizell Dene. In Coquetdale plentiful at Shillmoor. In the Wansbeck district in ditches north of Cambo, and at Roadley and Long Witton. In North Tynedale at Tarset and in Tecket and Hareshaw Denes. In the South Tyne district at Sinderhope, Allentown, Haltwhistle, Chesterholme, &c.; once carried down the Tyne to Newcastle. In the Derwent district in Gibside Woods, &c. Castle Eden Dene. Frequent in Weardale and Teesdale, ascending to Burnhope Woods and the high limestone scars up Harwood Beck, 550 yards, descending to Middleton.

18. ONOPORDUM, *L.*

1. *O. acanthium*, L. Alien.

Occasionally in waste ground. Holy Island, road-sides, and corners of fields, well established (W. Richardson!). Waste

ground at Gateshead (John Storey!). Railway bank north of Hartlepool (M. A. Lawson). Tees side at Croft (W. Foggitt).

19. CARLINA, *L.*

1. *C. vulgaris*, L. Native. Xerophilous. English type. Area C, N, D. Range 1, 2.

Only known in Cheviot-land on the coast links, as at Holy Island, Bambro', and the mouth of the Coquet. In Tyneland and Durham scattered amongst the limestone, ascending in Teesdale to Falcon Clints, 400 yards. Occasionally on the sandstone moors, as Gateshead Fell.

20. CENTAUREA, *L.*

1. *C. nigra*, L. Native. British type. Area C, N, D. Range 1, 2.

Common upon hedge-banks and in meadows, ascending to the high limestone scars of Kilhope and Harwood Dale, 550 yards. The radiate form is frequent in the upper part of Teesdale and Weardale.

2. *C. cyanus*, L. Colonist. British type. Area C, N, D. Range 1.

An occasional weed in cultivated fields, ascending Coquetdale to Rothbury, 150 yards.

3. *C. scabiosa*, L. Native. British type. Area C, N, D. Range 1.

Rare in Northumberland. In Cheviot-land gathered by Mr. Richardson near Warkworth. In Tynedale about Dilston, Corbridge, and Hexham. In Durham frequent upon the Magnesian Limestone.

4. *C. solstitialis*, L. Alien.

A weed in a field of lucerne between Marsden and Whitburn, 1864 (B.).

21. BIDENS, *L.*

1. *B. cernua*, L. Native. English type. Area N, D. Range 1.

Ditches, rare. In Tyneland at Prestwick Carr, and gathered by John Thompson near Crowhall Mill. In Durham at Norton (Miss Wharton), and near Birtley and Chester-le-Street (F.).

2. *B. tripartita*, L. Native. English type. Area C, N, D. Range 1.

In similar places to the preceding, more frequent. Chatton, Harnham, Corbridge, Prestwick Carr, Lamesley, Chester-le-Street, Durham, Bradbury, Morden Carr, &c.

22. EUPATORIUM, *L.*

1. *E. cannabinum*, L. Native. British type. Area C, N, D. Range 1.

Frequent in ditches and swamps and by river-sides in the low country, ascending to 200 yards in Teesdale.

23. TANACETUM, *L.*

1. *T. vulgare*, L. Native. British type. Area C, N, D. Range 1.

Frequent in the low country by stream-sides and in waste ground.

24. ARTEMISIA, *L.*

1. *A. maritima*, L. Native. Maritime. English type. Area C, N, D. Range 1.

Frequent along the coast-line in the salt marshes and by the stream-sides, both the type and var. *gallica*.

2. *A. absinthium*, L. Denizen. English type. Area C, N, D. Range 1, 2.

One of the commonest ballast plants, and occurring occasionally inland near villages and farm-houses. Seen in Teesdale at 400 yards.

3. *A. vulgaris*, L. Native. British type. Area C, N, D. Range 1, 2.

Frequent upon hedge-banks and in waste ground, ascending in Teesdale to Langdon Bridge, 400 yards, and in Coquetdale to Linn Shiels.

25. GNAPHALIUM, *L.*

1. *G. dioicum*, L. Native. Scottish type. Area C, N, D. Range 1, 2.

Frequent upon upland heaths, ascending to 500 yards in Teesdale, and 550 yards in West Allendale, descending to Prestwick Carr, and in Coquetdale to the road-side near Holystone. On the basalt at Dunstanbro', Spindlestone, and Gunnerton.

2. *G. sylvaticum*, L. Native. British type. Area C, N, D. Range 1, 2.

Not unfrequent in uncultivated sandy soil, ascending to Wooler Common, to 300 yards in Allendale, and 450 yards in Weardale.

3. *G. uliginosum*, L. Native. British type. Area C, N, D. Range 1.

Frequent in cultivated fields and sandy soil, ascending North Tynedale to Hareshaw Moor (Professor Oliver and W. H. Brown), and in Allendale near Gatton to 300 yards.

26. FILAGO, *L.*

1. *F. minima*, Fries. Native. British type. Area C, N, D. Range 1.

Scattered in sandy soil. Frequent on the porphyritic debris round the base of the Cheviots about Alwinton and Wooler, especially in the beds of the streams. Alnwick Moor, Howick, Kyloe Crags, Rothbury, Cockfield Fell, Winch Bridge, 300 yards, &c.

2. *F. germanica*, L. Colonist. British type. Area C, N, D. Range 1.

Frequent in cultivated fields on sandy soil, ascending to the

ridge of Kyloe Crags, and in North Tynedale to Tarset Moor, 250 yards (W. H. Brown).

27. PETASITES, *Gaertn.*

1. *P. vulgaris*, Desf. Native. British type. Area C, N, D. Range 1.

Common in swamps and by stream-sides, ascending in Weardale to St. John's Chapel, 950 feet, in Coquetdale to Linn Shiels, in North Tynedale high up in Tecket Dene.

28. TUSSILAGO, *L.*

1. *T. farfara*, L. Native. British type. Area C, N, D. Range 1–3.

Common on clayey banks and in cultivated fields, ascending to 650 yards on Highfield, 600 yards in Welhope, 550 yards in West Allendale.

29. ERIGERON, *L.*

1. *E. acris*, L. Native. English type. Area C, N, D. Range 1.

Sandy ground, rare. On Holy Island on the links north of the castle (F.), not seen recently. On the links north of Seaton Sluice (F. B.). Scattered on the Magnesian Limestone; Byers Quarry near Whitburn, Fawdon, Hesleden Dene, Castle Eden Dene (F. R.). Gathered also by John Hogg at Owton near Greatham, and M. A. Lawson at Seaton Carew.

30. ASTER, *L.*

1. *A. tripolium*, L. Native. Maritime. British type. Area C, N, D. Range 1.

Frequent along the coast-line in salt marshes and at the mouth of the streams.

31. SOLIDAGO, *L.*

1. *S. virgaurea*, L. Native. British type. Area C, N, D. Range 1, 2.

Frequent in woods and on shaded rocks, especially amongst

the hills, ascending to 1400 feet in Dunsdale on Cheviot, as high in the Derwent district, and to 500 yards in Teesdale.

32. SENECIO, *L.*

1. *S. vulgaris*, L. Native. British type. Area C, N, D. Range 1, 2.

Common everywhere in waste ground, ascending to 550 yards in Harwood Dale and East and West Allendale, to 350 yards at Broadstruther House near Wooler.

2. *S. sylvaticus*, L. Native. British type. Area C, N, D. Range 1.

Frequent on sandy heaths, ascending to 250 yards near Alwinton. Very fine all round the base of the Cheviots amongst the porphyritic debris.

3. *S. viscosus*, L. Native. Germanic type. Area C, N, D. Range 1.

Waste ground in sandy soil. Near Budle (T.). Alnwick Moor (R. Embleton). Near the riding stables at Easington (Johnston). Alnmouth (F.). Heaton Dene and Benwell near Newcastle (F.). Road-sides near Chirton and Wallsend (W. H. Brown). In a quarry of Magnesian Limestone at Marsden (B.). On the ballast hills about Sunderland, Seaham, and Hartlepool (F. R.).

4. *S. erucæfolius*, L. Native. English type. Area C, N, D. Range 1.

Hedge-banks about Whitley and along the Magnesian Limestone from Shields to Hartlepool and Darlington. By the Tweed near Ord Mill (Dr. Thompson. F.).

5. *S. Jacobæa*, L. Native. British type. Area C, N, D. Range 1, 2.

Common everywhere in waste and grassy places, ascending in Harwood Dale to 600 yards, and to 550 yards in Welhope and Allendale. A rayless form gathered by the Tees near Upper Cronkley Bridge (B.).

6. *S. aquaticus*, Huds. Native. British type. Area C, N, D. Range 1, 2.

Common in ditches and damp fields, ascending to 500 yards in Irishope, the Wear district, and in Teesdale to Langdon Bridge, 400 yards.

7. *S. saracenicus*, L. Alien.

Gathered by John Thompson many years ago on the banks of the Erring Burn near Hallington.

33. DORONICUM, *L.*

1. *D. pardalianches*, L. Alien.

Road-side near West Balton near Alnwick (T.). In a plantation near Cresswell (John Storey!). Wear banks at Durham below Mr. Fox's garden (F!).

34. INULA, *L.*

1. *I. helenium*, L. Native? English type. Area D. Range 1.

On the north side of Castle Eden Dene about a mile from the sea (Jas. Jansen. F!). In Hardwick Dene, but perhaps planted (M. A. Lawson). Gathered long ago by Stephen Robson by the Tees near Darlington, but not seen recently.

35. PULICARIA, *Gaertn.*

1. *P. dysenterica*, Gaert. Native. English type. Area C, N, D. Range 1.

Not unfrequent in damp places in the low country. Becoming rare in Cheviot-land. Meadow near Calish Wood, Alnwick, Embleton, Holy Island, and by the side of the Wooler Water below the town.

36. BELLIS, *L.*

1. *B. perennis*, L. Native. British type. Area C, N, D. Range 1–3.

Everywhere common in grassy places, ascending to 750 yards on Highfield, 650 yards on Stangend Rigg.

37. CHRYSANTHEMUM, *L.*

1. *C. segetum*, L. Colonist. British type. Area C, N, D.

An occasional weed of cultivated fields, once plentiful, now rare. Warkworth, Haltwhistle, Newcastle, Hartlepool, Stockton, &c.

2. *C. leucanthemum*, L. Native. British type. Area C, N, D. Range 1, 2.

Common in grassy places, ascending to 500 yards in East Allendale, 550 yards in Harwood Dale.

38. PYRETHRUM, *L.*

1. *P. parthenium*, Sm. Denizen. British type. Area C, N, D. Range 1.

Waste places, not uncommon, but always near villages and farm-houses, ascending to 300 yards in East Allendale.

2. *P. inodorum*, Sm. Native. British type. Area C, N, D. Range 1.

A common weed of cultivated fields, ascending in Coquetdale above Alwinton, in Teesdale to Eglestone, and in Weardale to St. John's Chapel, 1000 feet.

3. *P. maritimum*, Sm. Native. Maritime. British type. Area C, N, D.

Not unfrequent along the coast. Holy Island, Dunstanbro', Bambro', Tynemouth, Marsden, &c. Care must be taken not to confound this with forms of the preceding, from which it differs in the fruit.

39. MATRICARIA, *L.*

1. *M. chamomilla*, L. Colonist. English type. Area N, D. Range 1.

A weed of cultivated ground, rare. Gateshead, Ponteland, Mason Dinnington, Kenton, &c.

40. ANTHEMIS, *L.*

1. *A. nobilis*, L. Native. English type. Area D. Range 1.

Between Lintz Green Hall and the turnpike (R. Waugh and John Thornhill. F.).

2. *A. arvensis*, L. Colonist. English type. Arear C, N, D. Range 1.

Not unfrequent in cultivated fields, ascending to the ridge above Doddington near Wooler, 400 feet. The plant called *A. maritima* has been shown by Professor Oliver (see Transactions, vol. IV, p. 45,) to be likely to be a form of this species.

3. *A. cotula*, L. Colonist. English type. Area C, N, D. Range 1.

Frequent in Tyneland and Durham as a weed of cultivated fields. Said to be rare in Cheviot-land and not included in Johnston's Flora of the Eastern Borders, but gathered lately by Dr. Maclagan near Lucker.

41. ACHILLEA, *L.*

1. *A. ptarmica*, L. Native. British type. Area C, N, D. Range 1–3.

Frequent in undrained pastures and on the edges of heaths, ascending to 550 yards in Allendale, 650 yards in Harwood Dale.

2. *A. millefolium*, L. Native. British type. Area C, N, D. Range 1–3.

Everywhere common in grassy places, ascending to 700 yards on Highfield.

Order 6. CAMPANULACEÆ.

1. CAMPANULA, *L.*

1. *C. rotundifolia*, L. Native. British type. Area C, N, D. Range 1–3.

Common on pastures and heaths, ascending to 800 yards on Cheviot.

2. *C. rapunculus*, L. Alien.

In a grassy field of the glebe at Norton (John Hogg. F.).

3. *C. latifolia*, L. Native. Scottish type. Area C, N, D. Range 1, 2.

Frequent by stream-sides and in ditches, ascending in Coquetdale to Rothbury, Teesdale to High Force Woods, Weardale above Wearhead Village, 1150 feet.

4. *C. rapunculoides*, L. Alien.

An occasional garden weed, as at Shields and Yarm. Right bank of the Derwent between Swalwell and the Tyne (R. B. Bowman).

5. *C. trachelium*, L. Alien.

Hulne Woods near Alnwick (R. Embleton. A.).

6. *C. glomerata*, L. Native. Xerophilous. Germanic type. Area C, N, D. Range 1.

Stocking Woods near Alnwick, formerly plentiful (R. Embleton): now apparently lost. In Tynedale from Gunnerton Crags, 150 yards, and the lime-kilns at Walldown past Hexham by the river-side to Riding Mills and Wylam. Woods near Cocken (F.). Gainford and Barbara Rigs near Barnard Castle (Rev. J. Harriman. F.). Meadow below Hesleden Church and woods near Pierce Bridge (M. A. Lawson).

2. SPECULARIA, *Herit.*

1. *S. hybrida*, A. D. C. Colonist. Germanic type. Area D. Range 1.

Corn-fields on Tunstall Hill near Sunderland (F!). Corn-fields near Norton (John Hogg. F. R!).

3. JASIONE, *L.*

1. *J. montana*, L. Native. British type. Area N, D. Range 1, 2.

Sandy ground, rare, and not known in Cheviot-land. Hedge-banks in Tynedale near Haltwhistle, Bardon Mills, and Hexham

(F. R!). Plentiful in Stella Dene (W. Robertson). Lanes between Winlaton and Crawcrook (R. B. Bowman). Dry banks near Durham city (John Thompson). Sandy ground near Hamsterley and Witton-le-Wear (F. R!). In Teesdale above High Force, 350 yards (M. A. Lawson).

Order 7. ERICACEÆ.

1. ERICA, *L.*

1. *E. tetralix*, L. Native. British type. Area C, N, D. Range 1–3.

Frequent on damp heaths, ascending to 600 yards on Cheviot, 700 yards on Kilhope.

2. *E. cinerea*, L. Native. British type. Area C, N, D. Range 1, 2.

Frequent on heaths, but preferring drier ones than the preceding, and consequently not so common amongst the upland moors or ascending so high. Rare for instance in the upper part of Teesdale, but seen on the basalt at 500 yards at the Caldron Snout and as high in the Cheviot tract. There are fine specimens of *E. vagans* in Robertson's collection in the Newcastle Museum, labelled "Near Corbridge, July, 1844, Mr. T. Johnson," but doubtless some mistake has occurred.

2. CALLUNA, *Salisb.*

1. *C. vulgaris*, Salisb. Native. British type. Area C, N, D. Range 1–3.

Everywhere very common on heaths, ascending to all the high peaks, Cheviot, 850 yards, Kilhope Law, &c.

3. ANDROMEDA. *L.*

1. *A. polifolia*, L. Native. Intermediate type. Area N. Range 1.

Rare in peat bogs. In the Wansbeck tract at Darden Lough

and in Green Leighton Moss, in South Tynedale in Muckle Moss and Prestwick Carr (F. R!). Range of altitude 100–600 feet.

4. ARBUTUS, *L.*

1. *A. uva-ursi*, L. Native. Highland type. Area N, D. Range 1, 2.

Reported by Wallis from Little Wanny House Crags near the head of the Wansbeck. In South Tynedale on the moor above Dipton Dene near Dilston, where it was first gathered by Lightfoot, the author of the *Flora Scotica*. On the Northumberland side of the Derwent in Acton Cleugh (F.). Reported also from the Allendale Moors. In Teesdale sparingly on Falcon Clints at 500 yards (B.).

5. VACCINIUM, *L.*

1. *V. myrtillus*, L. Native. British type. Area C, N, D. Range 1–3.

Everywhere common in denes and on heaths, ascending to all the peaks, 850 yards on Cheviot.

2. *V. vitis-idæa*, L. Native. Highland type. Area C, N, D. Range 1–3.

Frequent on all the higher moors, ascending to 700 yards on Kilhope Law and Highfield, 850 yards on Cheviot, descending to 150 yards in Alnwick Park (W. Richardson).

3. *V. uliginosum*, L. Native. Highland type. Area N, D. Range 1, 2.

Turfy bogs, rare. In South Tynedale on Caervoran Moor, the summit and slope towards the north of Walltown Crags, and plentiful in Baron House Bog (F. R!). Near an old camp on the south side of the Tyne at Lambley (Sir W. C. Trevelyan!). Reported by Wallis from the woods of Dipton Dene near Dilston. In Teesdale sparingly on the Moor Rigs above the High Force. Range of altitude 150–450 yards.

4. *V. oxycoccos*, L. Native. British type. Area C, N, D. Range 1–3.

Frequent in turf bogs at all levels, Hoselaw Loch, Learmouth Bog, Yevering Bell, Coldmorton Bog near Wooler, Howburn Bog near Lowick, Horton Bog near Doddington, Alnwick Moor, Kemmer Lough, Black Lough, Harbottle Loch, Wallington Moors, Baron House Bog, Crag Lough, Muckle Moss, Staward Peel, Kilhope Law, 700 yards, Derwent, Beamish, Urpeth, Irishope, Burnhope and Teesdale Moors.

6. PYROLA, *L.*

1. *P. rotundifolia*, L. Native. Germanic type. Area C, D. Range 1.

In Cheviot-land in Learmouth Bog, Newham Bog, Haiden Dene, and Allerton Dene (F. T.). In the Magnesian Limestone denes in several places; Castle Eden Dene, Hawthorne Dene, Hesleden Dene, and on the coast near Horden Hall (F. R!). In Birch Carr near Middleton-one-Row (James Ianson!).

2. *P. media*, Swz. Native. Scottish type. Area C, N, D. Range 1.

In Cheviot-land in Haiden, Twizell, Longridge and Ancroft Denes and on the heathy slope of Kyloe Crags (F. R!). In the Wansbeck tract in Roadley Woods (Miss Trevelyan. F!). In South Tynedale in Dipton and Scotswood Denes (F. R!). In Durham in Howns Wood near Medomsley, and the fir plantations of the Shull, Waskerley and Lanchester Moors, 250 yards (F. R!).

3. *P. minor*, L. Native. Scottish type. Area C, N, D. Range 1.

Frequent in fir plantations, ascending from the Magnesian Limestone denes to 400 yards in Teesdale (James Backhouse).

4. *P. secunda*, L. Native. Scottish type. Area C. Range 1.

Sparingly on the north face of Yevering Bell, just above the wood, discovered by Dr. Johnston and the Rev. A. Baird in

1834; regathered by Dr. Tate in 1866. Altitude about 200 yards.

7. MONOTROPA, *L.*

1. *M. hypopitys*, L. Incognit.

Reported by Wallis as not unfrequent in the woods about Wark in North Tynedale, probably in mistake for *Lathrea*.

Order 9. AQUIFOLIACEÆ.

1. ILEX, *L.*

1. *I. aquifolium*, L. Native. British type. Area C, N, D. Range 1.

Common in woods and hedge-rows, ascending to 950 feet in East Allendale, 200 yards on the banks of the Common Burn, Cheviot.

Order 10. OLEACEÆ.

1. LIGUSTRUM, *L.*

1. *L. vulgare*, L. Native. English type. Area D. Range 1.

Truly wild in some of the Magnesian Limestone denes, as Hesleden and Castle Eden, on the sea-banks between Seaham and Hawthorn, and occasionally subspontaneous in hedges.

2. FRAXINUS, *L.*

1. *F. excelsior*, L. Native. British type. Area C, N, D. Range 1, 2.

Common in woods and hedge-rows, ascending to 350 yards in Goldscleugh, and high up in Tecket and Hareshaw Denes. Planted in Teesdale up to 1600 feet.

Order 11. APOCYNACEÆ.

1. VINCA, *L.*

1. *V. minor* and *major*, L. Aliens.

Are both occasional stragglers from garden cultivation.

Order 12. GENTIANACEÆ.

1. GENTIANA, *L.*

1. *G. verna*, L. Native. Xerophilous. Intermediate type. Area D. Range 2.

In Teesdale plentiful on Fendrith Hill and Widdy Bank Fell, and carried down the streams into the dale. Range of altitude 350–550 yards.

2. *G. amarella*, L. Native. Xerophilous. British type. Area C, N, D. Range 1, 2.

Frequent on the coast links and limestone hills, ascending to the Sugar Limestone of Widdy Bank, 500 yards.

3. *G. campestris*, L. Native. British type. Area C, N, D. Range 1, 2.

Frequent in dry pastures, ascending from the coast links to 500 yards in Langdon Dale.

2. ERYTHRÆA, *Renealm.*

1. *E. centaurium*, Pers. Native. British type. Area C, N, D. Range 1.

Frequent in dry pastures and sandy ground. The Northumbrian plants referred to *pulchella* and *latifolia* both seem to be only forms of this.

2. *E. littoralis*, Hook. Native. Maritime. British type. Area C. Range 1.

On the coast links at Ross, Holy Island, and Bambro'.

3. CHLORA, *L.*

1. *C. perfoliata*, L. Incognit.

Reported by Wallis from "dry pastures a quarter of a mile west of Honeycleugh Crag near Chesterwood and Whinetly in South Tynedale."

4. VILLARSIA, *Vent.*

1. *V. nymphæoides*, Vent. Alien.

Planted in the ponds at Wallington (F.). In a pond near the Tyne below Howdon opposite Jarrow (W. H. Brown!).

5. MENYANTHES, *L.*

1. *M. trifoliata*, L. Native. British type. Area C, N, D. Range 1, 2.

Frequent on damp heaths and in peat bogs, ascending in Teesdale above the Caldron Snout, 500 yards, and in Goldscleugh, Cheviot, to 350 yards.

Order 13. POLEMONIACEÆ.

1. POLEMONIUM, *L.*

1. *P. cæruleum*, L. Native. Xerophilous. Intermediate type. Area C. Range 1.

On a steep porphyritic crag by the side of the Coquet at Shildykes above Alwinton (Professor Oliver!). Altitude about 200 yards.

Order 14. CONVOLVULACEÆ.

1. CONVOLVULUS, *L.*

1. *C. arvensis*, L. Native. English type. Area C, N, D. Range 1.

Corn-fields and hedge-banks, frequent in Durham and Tyneland, but becoming unfrequent in Cheviot-land and not known about Wooler.

2. *C. sepium*, L. Native. English type. Area C, N, D. Range 1.

Hedge-rows and stream-sides in the low country, not unfrequent southward, but a doubtful native of Cheviot-land.

3. *C. soldanella*, L. Native. Maritime. English type. Area D. Range 1.

On the South Shields sand-hills, first gathered by Messrs. Hancock and Bowman in 1828.

2. CUSCUTA, *L.*

1. *C. epilinum*, Weihe. Alien.

In a flax-field at Windygyle near Alnwick (T.).

2. *C. epithymum*, Murr. Native. English type. Area C. Range 1.

Gathered once by Dr. Johnston on *Calluna* between Heathpool Linn and Yevering Bell.

3. *C. trifolii*, Bab. Colonist. English type. Area N, D.

Parasitic on clover. Field at Norton Grange near Blyth, 1858. In two clover-fields near Stanton in 1822, and near Norton in 1858 (John Hogg!).

Order 15. SOLANACEÆ.

1. HYOSCYAMUS, *L.*

1. *H. niger*, L. Native. English type. Area C, N, D. Range 1.

Not unfrequent, especially near the coast in newly disturbed ground, but soon disappearing.

2. DATURA, *L.*

1. *D. stramonium*, L. Alien.

Has been gathered in waste ground at Alnwick, Durham, Darlington, Norton, &c.

3. SOLANUM, *L.*

1. *S. nigrum*, L. Colonist. English type. Area C, D. Range 1.

An occasional weed. Seen at Embleton, Shincliffe, Chester-le-Street, &c.

1. *S. dulcamara*, L. Native. English type. Area C, N, D. Range 1.

Frequent in hedge-rows and damp woods, ascending in Weardale to St. John's Chapel, 1000 feet.

4. ATROPA, *L.*

1. *A. belladonna*, L. Denizen. Xerophilous. English type. Area C, N, D. Range 1.

Bank of the stream that enters the Tweed at Horncliffe (H. Carr). Reported from the banks of the Wooler stream, but the plant was really the preceding. On the cliff below Tynemouth Castle, and by the waggon-way between Walbottle and Newburn (F. R!). Bank of the Wear near Durham Abbey (F.). Near Low Team (A.). Near the old mill at Coniscliffe (Rev. J. Harriman. F.). Near Pierce Bridge (E. Robson. F.).

Order 16. SCROPHULARIACEÆ.

1. VERBASCUM, *L.*

1. *V. thapsus*, L. Native. English type. Area C, N, D. Range 1.

Not unfrequent on hedge-banks in sandy soil, ascending North Tynedale to Barrasford, and near Wooler to Caldgate Mill (J. Mitchell).

2. *V. nigrum*, L. Alien.

Waste ground at Ord (Dr. Johnston). Hulne Abbey near Alnwick (T.).

2. VERONICA, *L.*

1. *V. arvensis*, L. Native. British type. Area C, N, D. Range 1, 2.

Frequent in cultivated fields and on dry banks, ascending to 600 yards above Allenheads, and in Teesdale to the Main Limestone of Newbiggin Moor, 550 yards.

2. *V. serpyllifolia*, L. Native. British type. Area C, N, D. Range 1–3.

Frequent by road-sides and in cultivated fields, ascending to 750 yards on Highfield. Var. *humifusa* on Cheviot in Goldscleugh (T.).

3. *V. scutellata*, L. Native. British type. Area C, N, D. Range 1, 2.

Frequent in swamps, especially amongst the moors, ascending to 1300 feet at the head of the Broadstruther Burn, Cheviot, and to 550 yards in Welhope, Weardale. Var. *parmularia* on a moor south of Bellingham (W. H. Brown!).

4. *V. anagallis*, L. Native. British type. Area C, N, D. Range 1.

Frequent in ditches in the low country, ascending in Coquetdale to Rothbury and Netherton, 150 yards.

5. *V. beccabunga*, L. Native. British type. Area C, N, D. Range 1–3.

Common in ditches and by the side of streams, ascending to 650 yards on Highfield, 600 yards on the moor behind Allenheads.

6. *V. officinalis*, L. Native. British type. Area C, N, D. Range 1, 2.

Frequent on dry banks and in heathy ground, ascending to 550 yards in Harwood Dale and West Allendale.

7. *V. montana*, L. Native. British type. Area C, N, D. Range 1.

Frequent in shaded woods, ascending to 200 yards in Roddam Dene, Cheviot.

8. *V. chamædrys*, L. Native. British type. Area C, N, D. Range 1–3.

Common in grassy places, ascending to 2000 feet on Highfield.

9. *V. hederifolia*, L. Native. British type. Area C, N, D. Range 1.

Common in cultivated fields and on hedge-banks.

10. *V. agrestis*, L. Colonist. British type. Area C, N, D. Range 1, 2.

Common in cultivated fields, ascending in Coquetdale to Alwinton, in Teesdale to Langdon Bridge, 400 yards.

11. *V. polita*, Fries. Colonist. British type. Area C, N, D. Range 1.

In similar places to the preceding but less frequent, ascending in St. John's Chapel, 1000 feet.

12. *V. Buxbaumii*, Ten. Colonist. English type. Area C, N, D. Range 1.

Not unfrequent as a weed in forage fields, ascending in Weardale to 1000 feet near St. John's.

3. BARTSIA, *L.*

1. *B. alpina*, L. Native. Intermediate type. Area D. Range 2.

On the banks of the Whey Sike and other streamlets that descend Widdy Bank Fell to Harwood Beck and the Tees. Range of altitude 350–550 yards.

2. *B. odontites*, Huds. Native. British type. Area C, N, D. Range 1, 2.

Frequent by road-sides and in cultivated fields, ascending in Teesdale to 350 yards near the High Force, and nearly as high in Rookhope.

4. EUPHRASIA, *L.*

1. *E. officinalis*, L. Native. British type. Area C, N, D. Range 1–3.

Common in pastures and on heaths, ascending to 800 yards on Cheviot, 600 yards on Kilhope Law.

5. RHINANTHUS, *L.*

1. *R. crista-galli*, L. Native. British type. Area C, N, D. Range 1–3.

Common in grassy places, ascending to 650 yards in Harwood Dale, 600 yards in Allendale, 350 yards on the banks of the Broadstruther Burn, Cheviot.

2. *R. major*, Angl. Colonist. Intermediate type. Area N, D. Range 1.

Gathered in Cheviot-land in corn-fields near West Newton in 1723 by Dr. Richardson, as recorded in the Dilleman edition of Ray's Synopsis, but not seen recently. In Tyneland and Durham it has been seen in many places, but it has no permanence in its stations: Benwell, Denton, Hartley, Elswick, Ryton, Crawcrook, Shotley Bridge, Bishop Auckland, Barnard Castle, &c.

6. MELAMPYRUM, *L.*

1. *M. pratense*, L. Native. British type. Area C, N, D. Range 1, 2.

Frequent in hilly woods and on heaths. Var. *montanum*, Johnst., occurs in Cheviot, Hedgehope, and many of our higher hills. Range 0–500 yards.

2. *M. sylvaticum*, L. Native. Scottish type. Area D. Range 1.

Recorded from woods near Hexham on the authority of Mr. F. Scott, but we have not seen specimens, and the only station we can give with certainty is the island in the Tees just above Winch Bridge, 300 yards (B.).

7. PEDICULARIS, *L.*

1. *P. sylvatica*, L. Native. British type. Area C, N, D. Range 1, 2.

Frequent in damp pastures, ascending to 500 yards in Burnhope, 550 yards in Harwood Dale.

2. *P. palustris*, L. Native. British type. Area C, N, D. Range 1, 2.

Frequent in peaty swamps, ascending to 550 yards in Welhope, 1700 feet in Harwood Dale.

8. SCROPHULARIA, *L.*

1. *S. aquatica*, L. Native. English type. Area N, D. Range 1.

Frequent by the side of streams in the low country in the two southern divisions.

2. *S. nodosa*, L. Native. British type. Area C, N, D. Range 1, 2.

Frequent upon hedge-banks and by the side of streams, ascending in Coquetdale to Linn Shiels, 1150 feet near Wear Head, and 350 yards in Teesdale. A plant, gathered by Professor Oliver between Hylton and Washington, Durham, is most likely *S. Ehrharti*.

3. *S. vernalis*, L. Alien.

Gathered by Mr. Makepeace near Otterburn.

9. DIGITALIS, *L.*

1. *D. purpurea*, L. Native. British type. Area C, N, D. Range 1, 2.

Frequent on heaths and amongst the rocks, especially of the sandstone and porphyritic hills, ascending to 500 yards in the Cheviot district, and to 1600 feet in Harwood Dale and Allendale. Said to be absent from the Magnesian Limestone. Is it really so?

10. ANTIRRHINUM, *L.*

1. *A. majus*, L. Alien.

Occasionally subspontaneous on old walls. Hulne Abbey, Warkworth Hermitage, the castle at Barnard Castle, wall at Kibblesworth, Chirton, &c.

11. LINARIA, *Mill.*

1. *L. cymbalaria*, Mill. Alien.

Like the preceding. Wall at Cleadon, Whitburn, Otterburn, Mitford, Seaton Sluice, &c.

2. *L. vulgaris*, Mill. Native. British type. Area C, N, D. Range 1.

Frequent on dry soil and hedge-banks, ascending to 200 yards in South Tynedale near Haydon Bridge.

3. *L. purpurea*, Mill. Alien.

On the walls of the castle at Barnard Castle (B.).

4. *L. minor*, Desf. Colonist. English type. Area C, D. Range 1.

An occasional weed. Waste ground near the Union Bridge, Berwick (Dr. Johnston). Seen casually several times near Embleton (R. Embleton). Fulwell Hills near Sunderland (F. R!). Corn-fields between Merrington and the Auckland turnpike (Miss Wharton). Railway bank near Old Stillington Station (M. A. Lawson).

12. LIMOSELLA, *L.*

1. *L. aquatica*, L. Native. Germanic type. Area D. Range 1.

Ditches near Cocken (W. Weighell. F.). In a piece of marshy ground surrounding a spring close to the village of Morden, with *Bidens tripartita* (Rev. A. M. Norman).

13. MIMULUS, *L.*

1. *M. luteus*, L. Alien.

By the Wooler Water near Earl Mill, and both above and below Wooler Bridge (J. Hardy. T. B.). By the Coquet below Holystone (O. Corder). Ditch by the road-side above the High Force (James Backhouse!).

Order 17. OROBANCHACEÆ.

1. OROBANCHE, *L.*

1. *O. major*, Angl. Native. English type. Area C, N, D. Range 1.

Not unfrequent, parasitic on broom. Ellingham, Eglingham, Bothal, Fourstones, Riding Mills, Scotswood, Elswick, Shotley Bridge, Cawsey, Urpeth, Beamish, West Dipton, Brancepeth, Raby, Hexham, &c. *O. elatior* is recorded by the Rev. J. Dalton from "near Elemore and not far from the gates of Burn Hall," but has not been seen lately.

2. *O. minor*, Sutt. Colonist. Germanic type. Area C. Range 1.

In a clover-field near Warkworth, 1865 (J. Chrisp!).

2. LATHREA, *L.*

1. *L. squamaria*, L. Native. English type. Area C, N, D. Range 1.

Not unfrequent in loamy woods on the roots of the hazel, ascending from Lumley and Popple Woods on the Wear to High Force Wood, 1000 feet.

Order 18. VERBENACEÆ.

1. VERBENA, *L.*

1. *V. officinalis*, L. Native? English type. Area C, N, D. Range 1.

Road-sides near villages and farm-houses, not unfrequent. Beadnell, Little Houghton, Corbridge, Riding Mills, Bywell, Ovington, Middleham, Hartlepool, Stainton, Bishopton, Chester-le-Street, Darlington, Norton, &c.

Order 19. LABIATÆ.

1. SALVIA, *L.*

1. *S. verbenaca*, L. Native. English type. Area C, N, D. Range 1.

Ruins of Norham Castle and on the basalt on Holy Island (F. T.). Banks below Tynemouth Castle, near Willington, and by the waggon-way near Newburn (F. B.). In Hawthorne Dene near Sailors' Hall (F.). On the limestone at Hartlepool, and on a dry gravelly hedge-bank between Blakiston and Thorpe (John Hogg.).

2. LYCOPUS, *L.*

1. *L. europæus*, L. Native. British type. Area C, N, D. Range 1.

Stream-sides and marshes, rare. In Cheviot-land in Newham Bog (R. Embleton. T.). Near Newcastle in Heaton Dene and Prestwick Carr (F. R!). By the Tyne near Bensham, and by the Team in several places (F. R!). Near Durham in Butterby Marsh (M. A. Lawson).

3. MENTHA, *L.*

1. *M. rotundifolia*, L. Native? English type. Area C, N, D. Range 1.

In Coquetdale at Alwinton, 150 yards, one patch only, not far from the church (B.). Ponteland (F.). In the lane between Pittington and Elemore, near where the road to Sunderland branches off (Rev. J. Dalton. F.). Near Barnard Castle on the Middleton road near where the first lane on the north branches off (James Backhouse).

2. *M. viridis*, L. Denizen. English type. Area D. Range 1.

By the Blackstone Burn near Waskerley (W. Backhouse). By the Tees at Nesham and Yarm (F. B.).

3. *M. piperita*, L. Native. English type. Area C, N, D. Range 1.

Watery places, rare. Ditch at Haggerstone near the blacksmith's shop (Dr. Johnston). Swineclose Wood near Ellingham (R. Embleton). Stannington and Mason Dinnington (F.). In the dene lane near Castle Eden (W. Backhouse. F.). By the Tees side near Yarm (B.). *M. crispa*, L., a commonly-cultivated mint, not known anywhere in a wild state, is figured in the Supplement to English Botany 2785, from specimens gathered by the late Mr. James Mitchell on the banks of the Wooler Water between Langlee-ford and the town.

4. *M. hirsuta*, L. Native. British type. Area C, N, D. Range 1, 2.

Common in watery places, ascending in Teesdale to 400 yards near Langdon Bridge.

5. *M. sativa*, L. Native. British type. Area C, N, D.

Ditches and stream-sides, not unfrequent, ascending in Weardale near Stanhope to 200 yards. *M. rubra*, Smith, occurs in Rugley Wood near Alnwick, and on the banks of the Team and Tees, *M. gentilis*, L., was gathered by Mr. Robertson in cornfields at Cleadon, *M. cardiaca*, Baker, by Winch on the banks of the Team, and *M. variegata*, Sole, a cultivated form, by Winch on the banks of the Wooler Water near the town.

6. *M. arvensis*, L. Native. British type. Area C, N, D. Range 1.

Frequent in cultivated fields and watery places, ascending to 300 yards in Teesdale, and 200 yards in North Tynedale.

7. *M. pulegium*, L. Native. English type. Area D. Range 1.

Borders of a pond at Winston near Gainford (Rev. J. Harriman. F!).

4. THYMUS, *L.*

1. *T. serpyllum*, L. Native. British type. Area C, N, D. Range 1–3.

Everywhere common on dry heathy banks, ascending to 550

yards on Cheviot, 750 yards on Highfield. *T. chamædrys*, Fries., was gathered by the late Mr. John Storey at Craster near Howick on the basalt. *T. lanuginosus*, Schk., occurs on Falcon Clints.

6. ORIGANUM, *L.*

1. *O. vulgare*, L. Native. Xerophilous. British type. Area C, N, D. Range 1, 2.

Woods and thickets, especially on the limestone and basalt, ascending to 350 yards in Teesdale near the High Force. By the Aln below Denwick Bridge. By the Coquet at Alwinton, Sharperton, Warkworth, &c. Walls of Mitford Castle. In North Tynedale in Tecket Dene, and down the Tyne as far as Bywell.

7. CALAMINTHA, *Moench.*

1. *C. acinos*, Clairv. Native. British type. Area C, N, D. Range 1.

Not unfrequent in dry fields. Haiden, Allerton, Doddington, Hetton, Eglingham, Bambro', Hexham, Marsden, Whitburn, Mainsforth, &c.

2. *C. nepeta*, Clairv. Native? English type. Area D. Range 1.

By the Wear near Durham Abbey, gathered first by Wilson and again by Winch, but we are not aware that it has been seen recently. *C. officinalis* is recorded in the Flora as having been gathered by E. Robson at Coniscliffe, and one of the two (*C. officinalis* according to Winch, *C. nepeta* according to Robertson,) grew near Gateshead, but the station was destroyed in 1823.

3. *C. clinopodium*, Spenn. Native. British type. Area C, N, D. Range 1, 2.

Frequent on hedge-banks and in thickets, ascending in Teesdale to 350 yards near the High Force.

7. TEUCRIUM, *L.*

1. *T. scorodonia*, L. Native. British type. Area C, N, D. Range 1, 2.

Frequent on sandy heaths and in thickets, ascending in Teesdale to 500 yards on Falcon Clints, to 450 yards in Allendale and the Cheviot ravines.

2. *T. chamædrys*, L. Alien.

Hedge-bank near the Gateshead Park Engine (F!), the station destroyed many years ago.

8. AJUGA, *L.*

1. *A. reptans*, L. Native. British type. Area C, N, D. Range 1, 2.

Common in grassy places, ascending to 500 yards in East Allendale, 1600 feet in Harwood Dale.

9. BALLOTA, *L.*

1. *B. nigra*, L. Native. English type. Area C, N, D. Range 1.

Common in the low country on hedge-banks and in waste ground, inland as far as Dilston, Morpeth, and Cornhill. On the basaltic crags at Spindlestone. Var. *ruderalis*, Fries., gathered by Mr. Storey in the lane between Hartley and Breardon Burn.

10. LAMIUM, *L.*

1. *L. album*, L. Native. British type. Area C, N, D. Range 1.

Common in the low country upon hedge-banks and in waste ground, ascending Coquetdale to Rothbury, Weardale to Stanhope, 650 feet.

2. *L. amplexicaule*, L. Native. British type. Area C, N, D. Range 1.

Waste ground and way-sides, frequent.

3. *L. intermedium*, Fries. Native. Scottish type. Area C. Range 1.

Ord fields near Berwick (Dr. Johnston). A weed in a field of oats on the hill-side north of Alwinton, 250 yards (B.).

4. *L. purpureum*, L. Native. British type. Area C, N, D. Range 1–3.

Common on waste ground and hedge-banks, ascending to 500 yards in East Allendale, 2000 feet in Harwood Dale near Grass-hill.

5. *L. incisum*, Willd. Native. British type. Area C, N, D. Range 1.

In similar situations to the preceding, but much less frequent.

11. LEONURUS, *L.*

1. *L. cardiaca*, L. Alien.

Formerly subspontaneous at Spring Gardens, Newcastle. Waste ground at Whitworth (Miss Wharton).

12. GALEOPSIS, *L.*

1. *G. ladanum*, L. Colonist. English type. Area C, N, D. Range 1.

Rare in Cheviot-land, and only, so far as we know, seen by Mr. Embleton near Embleton. In Tynedale at Chesterwood near Haydon Bridge (John Thompson), and Riding Mills (Edw. Procter!). Common along the Magnesian Limestone from South Shields to Sunderland, Hartlepool, and Darlington. Dry clayey corn-fields near Stockton (John Hogg).

2. *G. ochroleuca*, Lam. Colonist. English type. Area D. Range 1.

Abundant at Stephen's Hall between Winlaton and Crawcrook (R. B. Bowman. A!).

3. *G. tetrahit*, L. Colonist. British type. Area C, N, D. Range 1, 2.

Common in cultivated fields and waste ground, ascending to

350 yards in Teesdale near the High Force, 450 yards in Rookhope, Wear district. There are two forms which are both common, one with white flowers and the lower lip of the corolla broader, the other with red flowers, the middle lobe of the lower lip of the corolla with two bright yellow spots with a deep red line round them; but in both its edge is frequently recurved.

4. *G. versicolor*, Curt. Colonist. Scottish type. Area C, N, D. Range 1.

Frequent in cultivated fields, ascending in North Tynedale to Kielder (John Storey!), Redesdale to Chattlehope (W. H. Brown!), Coquetdale to Alwinton, the Wooler Water to Langleeford, 250 yards.

13. STACHYS, *L.*

1. *S. betonica*, Benth. Native. English type. Area C, N, D. Range 1, 2.

Common in dry pastures in Durham and Tyneland, ascending to 350 yards in Teesdale, 400 yards in Burnhope and East Allendale, 200 yards in North Tynedale, in Coquetdale to Rothbury, frequent about Alnwick, but becoming rare northward and not known anywhere round the base of the Cheviots.

2. *S. palustris*, L. Native. British type. Area C, N, D. Range 1, 2.

Frequent in damp places and cultivated fields, ascending in Coquetdale to Harbottle, in Allendale to 500 yards near Allenheads.

3. *S. ambigua*, Smith. Native. Local type. Area C, N, D. Range 1, 2.

This name apparently includes a series of forms hybrid between the preceding and following, some of which have been seen in Cheviot-land at Embleton (R. Embleton), in Tynedale near Lipwood and Hexham (F! R.), in Allendale in the wood at Allenheads, 450 yards (B.), by the Team near Lamesley, and the Derwent in Axwell Park (Professor Oliver!), and by the Skerne at Burdon Mills near Darlington (W. Backhouse!).

4. *S. sylvatica*, L. Native. British type. Area C, N, D. Range 1, 2.

Common upon hedge-banks and in woods, ascending to 1100 feet in Rookhope, 500 yards in Harwood Dale.

5. *S. arvensis*, L. Colonist. British type. Area C, N, D. Range 1.

Not unfrequent in cultivated fields. Lesbury, Howick, Bambro,' Rothbury, Doddington, Haydon Bridge, Hexham, Newcastle, Hartlepool, &c.

14. GLECHOMA, *L.*

1. *G. hederacea*, L. Native. British type. Area C, N, D. Range 1, 2.

Common on hedge-banks, ascending to 1300 feet in Welhope, Wear district.

15. NEPETA, *L.*

1. *N. cataria*, L. Native. English type. Area N, D. Range 1.

Hedge-banks, rare. In Tynedale at Hexham, Riding Mills, Ovingham, between Wylam and Newburn, and at Bywell and Chirton (F. R!). About the ruins of Langley Hall near Witton Gilbert, and at West Boldon and Houghton (F.). Near the Rainton turnpike gate (Miss Wharton). Norton near Stockton (W. H. Brown).

16. MARRUBIUM, *L.*

1. *M. vulgare*, L. Native. English type. Area C, N, D. Range 1.

Waste ground, rare. Rocks and links near Bambro' and Alnwick (F. T.). On the island in the Tyne below Hexham, and waste ground at Cullercoats (F. R!). In the lane that leads from Brearton to the Stainton road (John Hogg. F.).

17. PRUNELLA, *L.*

1. *P. vulgaris*, L. Native. British type. Area C, N, D. Range 1–3.

Everywhere common in grassy places, ascending to 2000 feet on Highfield, 600 yards above Allenheads, 500 yards on Cheviot.

18. SCUTELLARIA, *L.*

1. *S. galericulata*, L. Native. British type. Area C, N, D. Range 1.

Not unfrequent in bogs, ascending in South Tynedale to Crag Lough, 200 yards. Rare in Cheviot-land.

2. *S. minor*, L. Native. English type. Area D. Range 1.

On the moor above the hall at Shull near Wolsingham, 150–200 yards (W. Backhouse!).

Order 20. BORAGINACEÆ.

1. MYOSOTIS, *L.*

1. *M. palustris*, With. Native. British type. Area C, N, D. Range 1.

Frequent by stream-sides and in ditches, confined to the low country.

2. *M. repens*, Don. Native. British type. Area C, N, D. Range 1–3.

Frequent by stream-sides and in bogs amongst the moors, ascending to 650 yards on Cheviot, 600 yards in West Allendale, 550 yards in Welhope, 500 yards in Rookhope.

3. *M. cæspitosa*, Schultz. Native. British type. Area C, N, D. Range 1, 2.

Everywhere frequent in watery places, ascending to 550 yards on Cheviot, 500 yards in Teesdale and Weardale.

4. *M. sylvatica*, Ehrh. Native. English type. Area C, N, D. Range 1, 2.

Frequent in the woods of the hilly tracts, ascending in Cheviot-land to Roddam Dene, in Teesdale to High Force Wood, 350 yards.

5. *M. arvensis*, Hoffm. Native. British type. Area C, N, D. Range 1, 2.

Common upon hedge-banks and in cultivated ground, ascending in Teesdale to Falcon Clints, 500 yards.

6. *M. collina*, Hoffm. Native. British type. Area C, N, D. Range 1.

Not unfrequent on dry sandy banks, especially near the coast.

7. *M. versicolor*, Lehm. Native. British type. Area C, N, D. Range 1, 2.

In similar situations to the preceding but more common, ascending in Coquetdale above Alwinton, to 500 yards in Harwood Dale and East Allendale.

2. LITHOSPERMUM, *L.*

1. *L. officinale*, L. Native. Xerophilous. British type. Area D. Range 1.

Subspontaneous near Hulne Abbey, Alnwick (T.). Wild on the Magnesian Limestone at Hylton Dene, and in Hawthorn Dene and Castle Eden Dene (F. R!).

2. *L. arvense*, L. Colonist. British type. Area C, N, D. Range 1.

A frequent weed in cultivated fields, ascending in Coquetdale to Holystone, to 200 yards in Teesdale.

3. MERTENSIA, *Roth.*

1. *M. maritima*, Don. Native. Maritime. Scottish type. Area C. Range 1.

Recorded in the Dillenian edition of Ray's Synopsis from the

links at Scremerston near Berwick, and gathered there within the last twenty years, but now probably extinct. Plentifully on the north-east shore of Holy Island (G. S. Brady).

4. SYMPHYTUM, *L.*

1. *S. officinale*, L. Native. English type. Area C, N, D. Range 1.

Waste ground and stream-sides, rare. Banks of the Lucker Burn between Lucker and Spindlestone (R. Embleton). Lanes at Bambro' (W. Robertson). Ponteland, Benwell, Wallsend, Willington, Cullercoats, North Shields, and Jarrow. Plantation at Low Linn near Durham (H. Gregson). Castle Eden (M. A. Lawson). Polam near Darlington (J. Backhouse). Lane west of the station at Barnard Castle, 150 yards (B.). *S. tuberosum* is recorded from near Durham on the authority of E. Robson, but has not been seen recently.

5. BORAGO, *L.*

1. *B. officinalis*, L. Alien.

In a corn-field at Halidon near Wooler (Rev. A. Baird).

6. LYCOPSIS, *L.*

1. *L. arvensis*, L. Native. British type. Area C, N, D. Range 1.

Frequent in dry sandy ground, especially near the sea, ascending to 150 yards near Roddam, and in Coquetdale above Rothbury.

7. ANCHUSA, *L.*

1. *A. sempervirens*, L. Alien.

Waste ground near Denwick, Hulne Abbey, and West Boldon (T.). Subspontaneous at Preston near North Shields (W. H. Brown!).

8. ASPERUGO, *L.*

1. *A. procumbens*, L. Denizen. Local type. Area C. Range 1.

Waste ground on Holy Island, recorded thence in the Dillenian edition of Ray's Synopsis, rediscovered by Mr. W. Richardson in 1850. Amongst the ruins of Bambro' Castle and by the side of the road below it (F. R!).

9. CYNOGLOSSUM, *L.*

1. *C. officinale*, L. Native. English type. Area C, N, D. Range 1.

Waste ground, not unfrequent, especially near the sea.

10. PULMONARIA, *L.*

1. *P. officinalis*, L. Alien.

Subspontaneous in the parks at Hulne and Howick (F. T.).

11. ECHIUM, *L.*

1. *E. vulgare*, L. Native. British type. Area C, N, D. Range 1.

Dry sandy ground, frequent, especially near the sea, ascending to Caldgate Mill near Wooler, 150 yards.

Order 21. LENTIBULARIACEÆ.

1. PINGUICULA, *L.*

1. *P. vulgaris*, L. Native. Scottish type. Area C, N, D. Range 1–3.

Frequent on swampy heaths at all levels, ascending from the coast to 650 yards on Highfield, 550 yards on Cheviot and in Welhope.

2. UTRICULARIA, *L.*

1. *U. vulgaris*, L. Native. British type. Area C, N, D. Range 1.

Ponds and ditches, rare. In the pond at Spindlestone (Dr. Johnston. T.). Newham Lough (R. Embleton). Ditches at Alnmouth (T.). Prestwick Carr (F. R!). Ponds at Wallington (Sir W. C. Trevelyan. A.). About Scotswood and Blaydon (Professor Oliver!). In the Serpentine in Hardwick Park (F. R.). Hell Kettles near Croft (F. B.).

2. *U. intermedia*, Hayne. Native. Local type. Area N. Range 1.

In Prestwick Carr, Broomley Lough, and a bog near Crag Lough, 250 yards (F. R!).

3. *U. minor*, L. Native. British type. Area C, N. Range 1.

In Baron House Bog near Gilsland (F. R!). Learmouth Bog near Cornhill (T.). South Charlton Moor (R. Embleton). In South Tynedale on Plainmeller Fell, 250 yards (Miss Dale. F.).

Order 22. PRIMULACEÆ.

1. PRIMULA, *L.*

1. *P. vulgaris*, Huds. Native. British type. Area C, N, D. Range 1, 2.

Common in woods and on hedge-banks, ascending in Teesdale to High Force Wood, 350 yards, and to 1400 feet in the Dunsdale ravine of Cheviot.

2. *P. veris*, L. Native. British type. Area C, N, D. Range 1, 2.

Common in meadows and grassy places, ascending to the Main Limestone scars of Harwood Dale, 550 yards. Var. *elatior*, including a series of forms hybrid between this and the preceding, is not uncommon. This variety must not be confounded with the true *P. elatior* of Jacquim.

3. *P. farinosa*, L. Native. Intermediate type. Area C, N, D. Range 1, 2.

Rare in Tyneland. In the Wansbeck district near Netherwitton (Sir W. C. Trevelyan). Bog near Chollerford Bridge, and near a mineral well at Spital near Ovingham (F. R!). Frequent about the springs that issue from the Magnesian Limestone, as at Easington, Pensher, Hylton, Ferryhill, East Murton, Dalton-le-Dale, and Castle Eden. On the sea-banks between Ryhope and Seaham. In the Derwent district at Follingsby, and between Muggleswick Priory and the river, and by the Hyslop Burn near Camefield House. In the south-east tract at Stainton and Norton. Frequent in Weardale and Teesdale, ascending to the Widdy Bank plateau, 550 yards.

2. TRIENTALIS, *L.*

1. *T. europæa*, L. Native. Scottish type. Area C, N, D. Range 1, 2.

Widely scattered in the hilly tracts. Amongst the Cheviots on Hedgehope, between Broadstruther and Goldscleugh, and near the Middleton Hall shepherd's house. Frequent on the sandstone range from Chillingham and Twizell southward to Alnwick, descending to the Brislee Hill in Alnwick Park, 150 yards, and near Rugley to 200 feet (T.). Amongst the Coquet moors above Rothbury and Harbottle, in the Wansbeck tract at Catcherside, Green Leighton, and by Rothley Lake, and in Tynedale along the Roman Wall. In woods at the Sneep above Shotley Bridge (G. S. Brady). In Durham in Shull Woods (Professor Oliver), and near Butsfield, Spring Houses, and Waskerley (J. Thornhill). Ascends to 500 yards.

3. HOTTONIA, *L.*

1. *H. palustris*, L. Native. English type. Area D. Range 1.

Plentiful in Morden Carr, and occurring in ponds in several places about Stockton, Darlington, and Durham, and recorded from a pond at East Boldon near Sunderland, these two last apparently its most northern stations.

4. LYSIMACHIA, *L.*

1. *L. vulgaris*, L. Native. English type. Area N, D. Range 1.

Recorded by Wallis from the banks of the North Tyne at Low Park End near Nunwick, and ponds at Widehaugh near Dilston, but not seen recently. Peaty ditches on Baron House Bog, 150 yards (W. H. Brown!). Dukesfield near Hexham (R.). By the Wear near Lumley (Miss M. J. Hancock!). By the Skerne above Darlington (F. R!). This last station has been erroneously referred to *L. punctata*, L. The true *punctata* was gathered as a garden escape by Mr. Storey in Heaton Dene.

2. *L. nummularia*, L. Native. English type. Area N, D. Range 1.

Damp places, rare. Gathered by Mrs. Blackett in Heaton Dene, not seen lately. Damp hedge-bank a little on the Gateshead side of Ryton (W. H. Brown!).

3. *L. nemorum*, L. Native. British type. Area C, N, D. Range 1–3.

Frequent in shaded and damp places, ascending to 650 yards on Highfield, 550 yards in Welhope and the Cheviot ravines.

5. ANAGALLIS, *L.*

1. *A. arvensis*, L. Colonist. British type. Area C, N, D. Range 1.

Frequent in cultivated fields in the low country.

2. *A. cærulea*, Sm. Colonist. English type. Area C, N, D. Range 1.

Sparingly in corn-fields about Alnwick (Wallis). One specimen gathered by Mr. John Chrisp at Rugley. In the Wansbeck district near Mitford (Captain Mitford. F.). In a forage field two miles west of Norton (John Hogg. F.).

3. *A. tenella*, L. Native. British type. Area C, N, D. Range 1.

Not unfrequent in swampy ground amongst the coast links and lower moors, ascending to the sandstone ridge above Doddington, and in Teesdale to Eglestone, 200 yards.

6. SAMOLUS, *L.*

1. *S. valerandi*, L. Native. English type. Area C, N, D. Range 1.

Damp places, especially near the sea. In Cheviot-land at Alnmouth, Howick, Holy Island, and Bambro' (T.). In Tyneland in Prestwick Carr and near the Tyne at Willington (F. R!). In Durham at Southwick, Ryhope, Sunderland, Castle Eden, &c., and gathered long ago inland by Stephen Robson at Baydales near Darlington.

7. GLAUX, *L.*

1. *G. maritima*, L. Native. Maritime. British type. Area C, N, D. Range 1.

Common in damp places all along the coast.

Order 23. PLUMBAGINACEÆ.

1. ARMERIA, *Willd.*

1. *A. maritima*, Willd. Native. Submaritime. British type. Area C, N, D. Range 1, 2.

Common all along the coast. By the Tyne in various places from Alston down to Hexham. In Teesdale plentiful on one of the little streams that run down from the Sugar Limestone of Widdy Bank Fell into the lower part of the Weel, 500 yards, but not seen elsewhere in the district except a single patch near the head of the Whey Sike.

2. STATICE, *L.*

1. *S. limonium*, L. Native. Maritime. English type. Area C, D. Range 1.

On the rock called St. Cuthbert's, Holy Island (this station

has been erroneously referred to *S. bahusiensis*). Sparingly about the lower part of the Wear and Tees.

Order 24. PLANTAGINACEÆ.

1. PLANTAGO, *L.*

1. *P. major*, L. Native. British type. Area C, N, D. Range 1–3.

Everywhere common by road-sides and in waste ground, ascending to 650 yards on Highfield and Stangend Rigg.

2. *P. media*, L. Native. English type. Area C, N, D. Range 1, 2.

Frequent in grassy places, especially amongst the limestone, ascending in Teesdale to Falcon Clints, and in Harwood Dale to 1700 feet.

3. *P. lanceolata*, L. Native. British type. Area C, N, D. Range 1–3.

Common in grassy places and cultivated fields, ascending to 650 yards on Highfield and Stangend Rigg.

4. *P. maritima*, L. Native. Submaritime. British type. Area C, N, D. Range 1, 2.

Common on the rocks all along the coast. Inland on Alnwick Moor, Newcastle Town Moor, Unthank Moor, the basaltic ridge near Bavington, in Prestwick Carr, and frequent down the Tees, ascending to the Sugar Limestone of Widdy Bank Fell, 150 yards. We have taken plants from the latter station not more than two inches high and grown them into the ordinary coast form in two years.

5. *P. coronopus*, L. Native. Submaritime. British type. Area C, N, D. Range 1.

Dry sandy ground, almost confined with us to the coast links, but not unfrequent inland further south.

2. LITTORELLA, *L.*

1. *L. lacustris*, L. Native. British type. Area C, N. Range 1.

Known with us only in the Northumbrian tarns; Kemmer Lough, Holy Island Lough, Prestwick Carr, Rothley, Sweethope, Greenley, Broomley, and Crag Loughs, 250 yards.

Division 4. MONOCHLAMYDEÆ.

Order 1. CHENOPODIACEÆ.

1. CHENOPODIUM, *L.*

1. *C. olidum*, Curt. Colonist. Germanic type. Area N, D. Range 1.

Waste ground, rare. Coble Dene, North Shields (W. Robertson). Plentiful by road-sides at Westoe (F. F!).

2. *C. urbicum*, L. Colonist. Germanic type. Area C, D.

In cultivated ground at Howick and near Shilbottle (R. Embleton), and gathered also, according to the Transactions of the Berwick Club, in 1850 near Amble. Reported in the Flora as gathered near Darlington by W. Backhouse, and Field Houses by the Rev. J. Symons.

3. *C. rubrum*, L. Native. English type. Area C, N, D. Range 1.

Not unfrequent in the low country in waste ground, especially near the sea. Professor Babington informs us that he now considers the coast Cheviot-land plant that has been called *C. botryoides* to be most likely a dwarf maritime form of this species.

4. *C. murale*, L. Colonist. English type. Area C, N, D. Range 1.

Waste ground, very rare. Near the castle on Holy Island (F.). Not seen there recently. Road-sides at North Shields, Gateshead, Chester-le-Street, and Hartlepool (F. R!).

5. *C. album*, L. Colonist. British type. Area C, N, D. Range 1.

A common weed of cultivated ground, ascending to 250 yards in Coquetdale.

6. *C. glaucum*, L. Colonist. Germanic type. Area N, D. Range 1.

Waste ground, rare. Chirton and Ponteland (F.). Hartley links and South Shields sands, probably introduced with ballast (W. H. Brown!). Gathered by E. Robson, and more recently by James Ward at Darlington (!).

7. *C. bonus Henricus*, L. Denizen. British type. Area C, N, D. Range 1, 2.

Waste ground near villages and farm-houses, frequent, ascending in the Cheviot tract to Goldscleugh, to 350 yards in Rookhope, and 400 yards in Teesdale.

2. ATRIPLEX, *L.*

1. *A. portulacoides*, L. Native. Maritime. English type. Area N, D. Range 1.

About the mouths of the Tyne, Wear, and Tees, sparingly.

2. *A. arenaria*, Woods. Native? Maritime. Local type. Area C, N, D. Range 1.

By the Tyne at Jarrow and on the coast at Hartlepool, perhaps introduced with ballast.

3. *A. Babingtonii*, Woods. Native. Maritime. British type. Area C, N, D. Range 1.

Frequent all along the coast-line.

4. *A. hastata*, L. Native. British type. Area C, N, D. Range 1.

A common weed, ascending to 250 yards in Coquetdale, 450 yards in Rookhope and East Allendale. Var. *deltoidea*, Bab. is not uncommon about the Tyne, Wear, and Hartlepool.

5. *A. patula*, L., *A. angustifolia*, Sm. Native. British type. Area C, N, D. Range 1.

Along with the last but not so common, ascending to 350 yards in East Allendale. *A. erecta*, Huds. has been noticed by the road-side near Langlee Castle and in many other places.

6. *A. littoralis*, L. Native. Maritime. Area C, N, D. Range 1.

Frequent along the coast in the salt marshes.

3. BETA, *L.*

1. *B. maritima*, L. Native. Maritime. British type. Area N, D. Range 1.

On the coast at Hartley, Newbiggin, Ryhope, Sunderland, and about the Tees mouth.

4. SALSOLA, *L.*

1. *S. kali*, L. Native. Maritime. British type. Area C, N, D. Range 1.

Frequent all along the coast.

5. SCHOBERIA, *C. A. Meyer.*

1. *S. maritima*, Meyer. Native. Maritime. British type. Area C, N, D. Range 1.

Frequent all along the coast in salt marshes.

6. SALICORNIA, *L.*

1. *S. herbacea*, L. Native. Maritime. British type. Area C, N, D. Range 1.

Frequent all along the coast in damp places.

Order 2. POLYGONACEÆ.

1. POLYGONUM, *L.*

1. *P. bistorta*, L. Native. British type. Area C, N, D. Range 1, 2.

Not unfrequent in meadows. Banks of the Aln, Tyne, Team, Derwent, Wear, and Tees, ascending to 350 yards in Irishope, and 400 yards near Langdon Bridge.

2. *P. viviparum*, L. Native. Montane. Highland type. Area N, D. Range 1, 2.

Not known amongst the Cheviots. In Weardale from the Main Limestone scars of Welhope down to the river-side at St. John's Chapel. In Teesdale from the Main Limestone scars of Harwood Dale down to the river from Langdon to Middleton Bridge. Range of elevation 550–550 yards.

3. *P. amphibium*, L. Native. British type. Area C, N, D. Range 1.

Frequent in ponds and by stream-sides, ascending in Coquetdale above Rothbury, in Weardale to Frosterley, 150 yards.

4. *P. lapathifolium*, L. Native. British type. Area C, N, D. Range 1.

Damp places and cultivated fields, frequent, but not noted anywhere in the dales.

5. *P. persicaria*, L. Native. British type. Area C, N, D. Range 1, 2.

In similar places to the preceding, frequent, ascending to 250 yards in Coquetdale, 400 yards in Teesdale.

6. *P. hydropiper*, L. Native. British type. Area C, N, D. Range 1.

Frequent in ditches and by stream-sides, ascending in Coquetdale to Holystone, 150 yards.

7. *P. minus*, Huds. Native. English type. Area D. Range 1.

In Morden Carr, gathered originally by W. Backhouse, and recently by the Rev. A. M. Norman.

8. *P. aviculare*, L. Native. British type. Area C, N, D. Range 1, 2.

Everywhere common in waste ground, ascending to 600 yards in Kilhope, Wear district. For a description of the varieties known in the district reference must be made to a paper by the Rev. A. M. Norman in the 5th vol. of the Transactions, p. 140.

9. *P. Raii*, Bab. Native. Maritime. British type. Area C, N, D.

Amongst the coast links at Alnmouth (T.); between Meggy's Burn and Seaton Sluice (B.); and near Seaton Carew (T. J. Foggitt!).

10. *P. convolvulus*, L. Colonist. British type. Area C, N, D. Range 1.

Frequent in cultivated fields, ascending to 250 yards in Coquetdale, 300 yards in Weardale.

2. RUMEX, *L.*

1. *R. hydrolapathum*, L. Native. English type. Area D. Range 1.

Ponds and ditches, not uncommon in the south-east of Durham. Butterby Marsh, Morden Carr, and about the Skerne and the streamlets near Stockton.

2. *R. crispus*, L. Native. British type. Area C, N, D. Range 1–3.

Everywhere common by road and stream-sides, ascending to 550 yards in East Allendale, 650 yards in Harwood Dale.

3. *R. aquaticus*, L. Native. Scottish type. Area C, N, D. Range 1, 2.

In Coquetdale in a field by the side of the high-road just west

of Harbottle. In Allendale at Allenheads, Sipton, and Sinderhope. In Weardale at Boltburn, Daddre Shield, and Wearhead village. In Teesdale from the Widdy Bank farm-house down the dale to Barnard Castle. Range of altitude 150–450 yards.

4. *R. pratensis*, M. and K. Native. English type. Area N, D. Range 1, 2.

In Allendale near Allentown, in Weardale near Copthill Church and about the Frosterley lime-quarries, in Teesdale at Langdon and near the High Force, 150–400 yards, detected in all these stations by the Rev. W. W. Newbould.

5. *R. obtusifolius*, L. Native. British type. Area C, N, D. Range 1, 2.

Everywhere common by road-sides and in waste ground, ascending to 550 yards in Harwood Dale and East Allendale.

6. *R. sanguineus*, L. Native. British type. Area C, N, D. Range 1.

Frequent in watery places, ascending in Coquetdale to Rothbury, in Weardale above Stanhope, in Teesdale to Middleton, 250 yards.

7. *R. conglomeratus*, Murr. Native. British type. Area C, N, D. Range 1.

Frequent in watery places, ascending in Coquetdale to Rothbury, in Teesdale to 200 yards.

8. *R. maritimus*, L. Native. English type. Area D. Range 1.

In a splash walled round near Morden (M. A. Lawson). Gathered by the Rev. A. M. Norman near Hartlepool, and Mr. Baker at the Tees mouth, but probably introduced with ballast. *R. pratensis* is recorded by Johnston on the authority of the Rev. J. Baird as growing on the margin of Paston Lough, but we have not seen specimens.

9. *R. acetosa*, L. Native. British type. Area C, N, D. Range 1–3.

Everywhere common in grassy places, ascending to 850 yards on Cheviot, 750 yards on Highfield.

10. *R. acetosella*, L. Native. British type. Area C, N, D. Range 1, 2.

Common on sandy fields and heaths, ascending to 550 yards on Newbiggin Moor, 600 yards in West Allendale.

Order 3. ELÆAGNACEÆ.

1. HIPPOHAE, *L.*

1. *H. rhamnoides*, L. Denizen. Maritime. Germanic type. Area C. Range 1.

On the sea-banks near Howick, perhaps introduced (T.).

Order 4. THYMELACEÆ.

1. DAPHNE, *L.*

1. *D. laureola*, L. Native. English type. Area C, D. Range 1.

Hedges near Shilbottle, Calish Woods, and several other places near Alnwick (R. Embleton. T.). Not unfrequent on the Magnesian Limestone. Hedges near Hedworth and Hylton, Ryhope, Dalton, Hesleden, and Castle Eden Denes. Gathered by the Rev. J. Harriman at Whorlton, and by Mr. Hogg near Norton and Wynyard.

2. *D. mezereum*, L. Denizen. English type. Area D. Range 1.

Long known in a wood on the north side of Tunstall Hope near Sunderland, and gathered also by the Rev. A. M. Norman near Sedgefield.

Order 5. EMPETRACEÆ.

1. EMPETRUM. *L.*

1. *E. nigrum*, L. Native. Scottish type. Area C, N, D. Range 1–3.

Everywhere common on heaths, ascending from Prestwick Carr to all the peaks, 850 yards on Cheviot.

Order 6. EUPHORBIACEÆ.

1. EUPHORBIA, *L.*

1. *E. helioscopia*, L. Colonist. British type. Area C, N, D. Range 1.

Common in cultivated fields, ascending to 250 yards in East Allendale.

2. *E. platyphylla*, L. Alien.

Gathered once by Winch near a mill-race in Heaton Dene.

3. *E. esula*, L. Alien.

Walls of Hulne Abbey (T.). Hedge-bank at Cariteth in North Tynedale (R. Makepeace!).

4. *E. cyparissias*, L. Alien.

Hedge-bank four miles south of Alnwick (F!). Not known now.

5. *E. exigua*, L. Colonist. English type. Area C, N, D. Range 1.

Frequent in cultivated fields, not noted in the dales.

6. *E. peplus*, L. Colonist. British type. Area C, N, D. Range 1.

Frequent in cultivated ground, ascending in Coquetdale to Alwinton, 150 yards.

7. *E. lathyris*, L. Alien.

Wear bank below Mr. Fox's garden (F.), and found by Mr. Hogg in a corn-field at Norton.

8. *E. amygdaloides*, L. Native. English type. Area C. Range 1.

In a wood at Linden near Long Horsley (Rev. J. F. Bigge!).

2. MERCURIALIS, *L.*

1. *M. perennis*, L. Native. British type. Area C, N, D. Range 1, 2.

Common in woods and thickets, ascending to 550 yards in Harwood Dale.

2. *M. annua*, L. Colonist. English type. Area N, D. Range 1.

Very rare as a weed. Has been gathered near Newcastle and Sunderland.

Order 7. URTICACEÆ.

1. URTICA, *L.*

1. *U. urens*, L. Native. British type. Area C, N, D. Range 1, 2.

Frequent in waste places, ascending to 400 yards in Coquetdale, Weardale, and Teesdale, 550 yards in East Allendale.

2. *U. dioica*, L. Native. British type. Area C, N, D. Range 1–3.

Everywhere common in waste places, ascending to 500 yards on Cheviot, 650 yards on Stangend Rigg, 750 yards on Highfield.

2. PARIETARIA, *L.*

1. *P. diffusa*, M. and K. Native. British type. Area C, N, D. Range 1.

Frequent on old walls. Ford Castle, Hulne Abbey, Dunstanbro' and Bambro' Castles, Warkworth and Morpeth Castles,

Tynemouth Priory, Allansford Bridge, Barnard Castle, Durham Abbey, &c.

3. HUMULUS, *L.*

1. *H. lupulus*, L. Denizen. English type. Area C, N, D. Range 1.

Sometimes seen in hedges, but not native, ascending Coquetdale to Alwinton, 150 yards.

4. ULMUS, *L.*

1. *U. montana*, Sm. Native. British type. Area C, N, D. Range 1, 2.

Common in hedge-rows and truly indigenous in many places, ascending to 400 yards.

2. *U. suberosa*, Ehrh. Denizen. English type. Area C, N, D. Range 1.

Woods and hedges, not uncommon, but probably not truly indigenous.

Order 8. AMENTIFERÆ.

1. QUERCUS, *L.*

1. *Q. robur*, L. Native. British type. Area C, N, D. Range 1, 2.

Frequent in woods and hedges, occurring in the peat mosses and aboriginal woods, ascending to 400 yards. Var. *sessiliflora* is not uncommon in the hill woods, and var. *intermedia* was gathered by Mr. Storey near Ravensworth. The beech, chestnut, and hornbeam are all not unfrequently planted, especially the first, but have no claim to be regarded as indigenous.

2. CORYLUS, *L.*

1. *C. avellana*, L. Native. British type. Area C, N, D. Range 1, 2.

Common in woods and thickets, ascending to 350 yards in Goldscleugh, and 1450 feet on Falcon Clints.

3. ALNUS, *L.*

1. *A. glutinosa*, L. Native. British type. Area C, N, D. Range 1, 2.

Common by stream-sides and in damp woods, ascending to 350 yards in Teesdale and East Allendale, and to 1150 feet in Weardale.

4. BETULA, *L.*

1. *B. alba*, L. Native. British type. Area C, N, D. Range 1, 2.

Common upon heaths and in woods amongst the hills, ascending to 500 yards in Teesdale. *B. glutinosa*, Fries., is the common moorland form.

2. *B. nana*, L. Incognit.

There is a specimen in Winch's Herbarium at the Linnean Society marked, "In moss-holes on Wooler Common, N. Said to have been found by Mr. Veach." The station seems altogether unlikely for the true plant, being within the Midagrarian zone.

5. POPULUS, *L.*

1. *P. alba*, L. Denizen. English type. Area C, N, D. Range 1.

Not unfrequent by the stream-sides and in damp woods. It is regarded by Winch as indigenous, but we have no confidence in its claim to be so considered.

2. *P. canescens*, Sm. Denizen. English type. Area C, N, D. Range 1.

In similar places to the preceding, but less frequent. There are several fine trees in a hedge on the south side of the Coquet near Rothbury.

3. *P. tremula*, L. Native. British type. Area C, N, D. Range 1, 2.

Frequent in woods and hedges, ascending in Teesdale to 1450 feet on Falcon Clints.

6. SALIX, *L.*

1. *S. pentandra*, L. Native. Scottish type. Area C, N, D. Range 1, 2.

Frequent in damp woods and by stream-sides, ascending in Coquetdale to Harbottle, in Allendale to 450 yards, and in Teesdale to the junction of the Whey Sike with Harwood Beck. Winch's *S. amygdalina* is this species, not *S. triandra*.

2. *S. fragilis*, L. Native. British type. Area C, N, D. Range 1, 2.

Common by stream-sides and in damp woods, ascending in Weardale to 1000 feet near St. John's Chapel, and in East Allendale to 450 yards, but perhaps not indigenous in the Middle zone.

3. *S. alba*, L. Native. British type. Area C, N, D. Range 1.

Stream-sides and damp woods, often associated with the last, ascending in Allendale to 250 yards near Catton. Vars. *cærulea* and *vitellina* both occur occasionally.

4. *S. triandra*, L. Native. English type. Area C, N, D. Range 1.

Frequent by stream-sides in the low country, ascending to the Till at Wooler and the mouth of the Erring Burn at Barrasford.

5. *S. purpurea*, L. Native. British type. Area C, N, D. Range 1, 2.

Stream-sides and damp woods, most frequent in the dales, as by the Tees about Middleton, the Wooler Water below Caldgate Mill, the Till at Branton, the Coquet at Sharperton. Ascends in East Allendale to 1450 feet. Var. *Helix* not uncommon.

6. *S. rubra*, Huds. Native. English type. Area C, N, D. Range 1.

Stream-sides, confined to the low country. Banks of the Wooler Water, Tyne, Team, Derwent, Wear, and Tees.

7. *S. viminalis*, L. Native. British type. Area C, N, D. Range 1, 2.

Common by stream-sides and in damp woods, ascending to 450 yards in East Allendale.

8. *S. Smithiana*, Willd. Native. English type. Area C, N, D. Range 1, 2.

Along with the preceding, common, and also ascending to 450 yards at Allenheads.

9. *S. cinerea*, L. Native. British type. Area C, N, D. Range 1, 2.

Stream-sides, hedge-rows, and damp woods, common, ascending to 500 yards in Allendale.

10. *S. aurita*, L. Native. British type. Area C, N, D. Range 1, 2.

Frequent in damp woods, especially in swamps amongst the moors, ascending to 500 yards in the Cheviot ravines, 550 yards in Harwood Dale.

11. *S. caprea*, L. Native. British type. Area C, N, D. Range 1, 2.

Common in woods and hedges, ascending to 450 yards in East Allendale, 550 yards in Harwood Dale. Var. *sphacelata*, Sm., a form closely resembling *S. cinereo-aurita*, Wimmer, on the banks of the burn below Usway Ford. Judging from his Herbarium, Winch's *S. acuminata* is a form of this species.

12. *S. nigricans*, Fries. Native. Scottish type. Area C, N, D. Range 1, 2.

On the banks of all the hill-streams, and occasionally also in the low country. In the Cheviot tract in Goldscleugh and at Heathpool Linn. Banks of the Tweed near the Chain Bridge, and hedge at Mount Pleasant near Berwick. By the Coquet about Alwinton and Rothbury, in North Tynedale in Tecket Dene and down the river in many places, in Allendale about Sinderhope, in the dale of the Derwent ascending to 1300 feet

near the head of the Knucton Burn, in Weardale plentiful in the upper part, but in Teesdale much less abundant than *phylicifolia*. Castle Eden Dene. We include here a wide range of forms, amongst which are *rupestris*, *hirta*, and *Andersoniana* of English Botany.

13. *S. laurina*, Sm. Native. Scottish type. Area C, N, D. Range 1, 2.

Rothley Lake and hedges north of Cambo (F !). In the upper part of the dale of the Derwent on the banks of the Knucton and Beldon Burns (F !). Gathered on the banks of the former by Mr. Baker in 1865, at an elevation of 1400 feet. *S. tenuifolia* is recorded by Dr. Johnston from Learmouth Bog.

14. *S. phylicifolia*, L. Native. Scottish type. Area C, N, D. Range 1, 2.

Not noticed in the Cheviot tract, but most likely overlooked. By the Tyne in several places. By the Irthing at Wardrew, and abundant in the upper part of Allendale, Derwentdale, Weardale, and especially of Teesdale, ascending to 400 yards in Irishope, 500 yards near Allenheads, and 550 on the limestone scars in Harwood Dale with *aurita*. The common forms with us are *Weigeliana*, *nitens*, and *Croweana*, and a plant from Prestwick Carr is called *radicans* by Smith in Winch's collection.

15. *S. repens*, L. Native. British type. Area C, N, D. Range 1, 2.

Common on heaths, ascending to 450 yards in Teesdale and Derwentdale, 500 yards in Harwood Dale.

16. *S. ambigua*, Ehrh. Native. British type. Area N. Range 1.

On the edge of Dilston Fell by the side of the high-road between Dilston and Hexham, 150 yards, growing in small quantity amongst *S. aurita* and *repens*, between which it is probably a hybrid (B.).

17. *S. arenaria*, Sm. Incognit.

"On the Teesdale Moors, but I do not know the exact spot:" Rev. J. Harriman in Winch's Flora. Probably a mistake, as the species is known in the Scotch Highlands only. *S. rosmarinifolia* is also given as a Durham species in the Flora, but it appears to have been considered as a British species at all by a mistake only.

7. MYRICA, *L.*

1. *M. gale*, L. Native. British type. Area C, N. Range 1.

Not known amongst the Cheviots. About the sandstone ridge in several places from Hetton and Lowick southward by way of Twizell and the Kimmer Lough towards Alnwick. Bogs near Alnmouth. In Coquetdale about Harbottle Lough, 250 yards, and the hill-slope below the Drake Stone. In the Wansbeck tract at Rothley Lake. In South Tynedale on the south side of the Tyne near Hepple (E. Woodhouse. F.). Not known in Durham.

Division 5. GYMNOSPERMEÆ.

Order 1. CONIFERÆ.

1. TAXUS, *L.*

1. *T. baccata*, L. Native. Xerophilous. English type. Area N, D. Range 1.

Perhaps wild on the banks of the Aln opposite Alnwick Abbey (T.). Cliffs on the western margin of the Allen (Wallis). Castle Eden Dene. On the limestone scars of Teesdale and Weardale truly wild in several places, ascending to 500 yards on Falcon Clints.

2. PINUS, *L.*

1. *P. sylvestris*, L. Native. British type. Area C, N, D. Range 1, 2.

The remains of the Scotch fir occur plentifully in peat mosses in several places both in the low country and amongst the hills.

At Yarrow near Kielder Castle for instance, we read in the Directory, "After the peat on a hill had been consumed the remains of an extensive pine-forest were found, which caused the spot to be called Fir-tree Moss." See Winch's remarks in Geog. Contrib., p. 9.

3. JUNIPERUS, *L.*

1. *J. communis*, L. Native. British type. Area C, N, D. Range 1, 2.

Scattered amongst the hill tracts from the Cheviots to the Tees, ascending to 500 yards in Harwood Dale, and occurring also in the Magnesian Limestone denes and sometimes amongst the coast links.

Class 2. MONOCOTYLEDONS OR ENDOGENS.

Division 1. FLORIDEÆ.

Order 1. ORCHIDACEÆ.

1. NEOTTIA, *L.*

1. *N. nidus-avis*, L. Native. British type. Area C, N, D. Range 1.

Dense woods, rare. In the dene at Twizell (Johnston). Cauledge Woods near Alnwick (T.). In the Wansbeck tract at Wallington and Capheaton (Miss Trevelyan. F.). In South Tynedale at Wardrew, Staward Woods, 150 yards, Riding Mills, Willimoteswick, and Dipton Denes (F. R!). By the Derwent at the Sneep near Shotley Bridge (James Backhouse, jun.). Whorlton Haugh Wood near Cocken, Streatlam near Barnard Castle, and in Castle Eden and Hawthorn Denes (F. R!).

2. LISTERA, *R. Br.*

1. *L. cordata*, R. Br. Native. Scottish type. Area C, N, D. Range 1, 3.

In the Cheviot tract on Hedgehope, on Cheviot near the *Cornus* station, near Linhope Linn, and in Dunsdale. On the links

of Holy Island, an unusual station for this plant of hilly heaths. On the sandstone ridge near Ross Castle, Twizell, Edlingham, and on Alnwick Moor, Simonside, Harbottle Moor, and in the Wansbeck tract at Darden and Rothley. In Tynedale on the Haltwhistle and Sewing Shields hills and in Prestwick Carr. In Allendale, ascending to 600 yards. In Durham on the Beldon and Muggleswick Moors, and in Teesdale above Eglestone near the station for *Malaxis*.

2. *L. ovata*, R. Br. Native. British type. Area C, N, D. Range 1–3.

Frequent in meadows and damp grassy places, ascending in Coquetdale to Windyhaugh, in Harwood Dale to 650 yards.

3. EPIPACTIS, *Rich.*

1. *E. latifolia*, A. Native. British type. Area C, N, D. Range 1.

Not unfrequent in woods, ascending in South Tynedale to 200 yards near Langley Castle.

2. *E. palustris*, Sw. Native. English type. Area C, N, D. Range 1.

Not unfrequent in swamps; Haiden Dene, Alnmouth, Newham, Spindlestone, Ellingham, Chevington, Rothley, Kirkwhelpington, Kirkharle, Belsay, Hexham, Butterby, Cocken, Hylton, Castle Eden Dene, Seaham, Hartlepool, Darlington, Stockton, &c.

4. CEPHALANTHERA, *Rich.*

1. *C. ensifolia*, Rich. Native. English type. Area D. Range 1.

Sparingly in some of the Magnesian Limestone denes; Castle Eden Dene, Hawthorn Dene, Horden Dene, Hesleden Dene (F. R!).

5. ORCHIS, *L.*

1. *O. morio*, L. Native. English type. Area C, N, D. Range 1.

In Cheviot-land this seems to have been gathered at one place

only, Ratcheugh Crag near Alnwick; but it is not uncommon in the low country in Tyneland and Durham, especially on the Magnesian Limestone. Professor Oliver gathered a branched specimen near Wylam.

2. *O. mascula*, L. Native. British type. Area C, N, D. Range 1.

Frequent in woods and thickets, not noted anywhere in the dales.

3. *O. ustulata*, L. Native. British type. Xerophilous. Area N, D. Range 1.

In Northumberland this has been gathered only on the coast links between Cullercoats and Tynemouth. In Durham it is scattered over the Magnesian Limestone from Marsden to Hartlepool and Darlington, and occurs also in meadows near the Tees at Dinsdale and Middleton-one-Row.

4. *O. pyramidalis*, L. Native. Xerophilous. Germanic type. Area C, N, D. Range 1.

In Cheviot-land in a field near Embleton (Mr. Armstrong), and said to have been also gathered near Wooler. In Tynedale near Haltwhistle (R!), and reported by Wallis from meadows north of Crag Lake, but not seen there recently. In Briar Dene near Whitley and in a field south of Cullercoats (W. H. Brown!). In Durham scattered over the Magnesian Limestone from Whitburn, Marsden, and Cleadon to Castle Eden and Hartlepool, and gathered by Mr. Hogg in the Red Sandstone tract three miles south-west of Norton.

5. *O. latifolia*, L. Native. British type. Area C, N, D. Range 1, 2.

Frequent in damp pastures, ascending to 1600 feet in Harwood Dale.

6. *O. maculata*, L. Native. British type. Area C, N, D. Range 1, 2.

Common in similar places to the preceding, ascending to 1600 feet in Harwood Dale, and 500 yards in Allendale.

6. GYMNADENIA, *R. Br.*

1. *G. conopsea*, R. Br. Native. British type. Area C, N, D. Range 1, 2.

Frequent both in damp and dry meadows, ascending to 500 yards in Harwood Dale, and nearly as high in the Derwent district.

7. HABENARIA, *R. Br.*

1. *H. bifolia*, R. Br. Native. British type. Area C, D. Range 1.

Heathy pastures, apparently much less frequent with us than the next. Rugley near Alnwick (T.). In two grass fields adjoining Red Barns House near Hartlepool (M. A. Lawson). Near Foxhill between Norton and Sadberge (John Hogg!). Pastures near Sedgefield (Rev. A. M. Norman!).

2. *H. chlorantha*, R. Br. Native. British type. Area C, N, D. Range 1, 2.

Not unfrequent in meadows and grassy woods, especially amongst the hills, ascending to 500 yards in Harwood Dale.

3. *H. viridis*, R. Br. Native. British type. Area C, N, D. Range 1, 2.

Frequent in grassy places, ascending in the Cheviot tract to Langlee-ford Hope (James Hardy), to 500 yards in Harwood Dale.

4. *H. albida*, R. Br. Native. Scottish type. Area N, D. Range 1, 2.

Not known in Cheviot-land. In the Wansbeck tract in a field near Cambo, on the banks of the Fallow Lees Burn and near Rothley Lake (Miss Trevelyan. F!). In North Tynedale on the basaltic ridge close to Barrasford (Wallis). In the Derwent district at Bay Bridge near Blanchland and on both sides of the Knucton Burn, and in South Tynedale in pastures at Sewing Shields (F!). In Teesdale plentiful west of the junction of Langdon Beck with the main stream and less abundant in the

meadows towards the High Force. Range of elevation, 150–400 yards.

8. OPHRYS, *L.*

1. *O. apifera*, Huds. Native. Xerophilous. English type. Area D. Range 1.

Scattered very sparingly over the Magnesian Limestone in Durham. It has been gathered at Roker Gill, Marsden, Ryhope, Byers Quarry near Whitburn; and also by Miss Hancock near the Tees at Middleton-one-Row.

2. *O. muscifera*, Huds. Native. Xerophilous. English type. Area D. Range 1.

Scattered like the preceding amongst the Magnesian Limestone. Has been gathered in Dalton Dene, Hawthorn Dene, Castle Eden Dene, Horden Dene, and by the Tees at Dinsdale and Middleton-one-Row.

9. MALAXIS, *Sw.*

1. *M. paludosa*, Sw. Native. British type. Area N. D. Range 1, 2.

Gathered by John Thompson in Muckle Moss near Bardon Mills, and seen once on Dryderdale Moor above Shull near Wolsingham by W. Backhouse. In the Tees district there is a well-established station, first discovered by John Binks about the beginning of the century in a moist hollow on the banks of the Egglesburn near the Manor Gill lead mine on Eglestone Moor. Range of altitude, 150–500 yards.

10. CYPRIPEDIUM, *L.*

1. *C. calceolus*, L. Native. Intermediate type. Area D. Range 1.

Once plentiful in Castle Eden Dene, but now, we fear, nearly extirpated. First mentioned in Stephen Robson's Flora, published in 1777.

Order 2. IRIDACEÆ.

1. IRIS, *L.*

1. *I. fœtidissima*, L. Native. English type. Area D. Range 1.

Damp woods, very rare. Cowclose near Gateshead (W. Robertson and John Thornhill!). In a wood north of Sunderland Bridge near Rushyford (W. Backhouse!). Jolby near Darlington (E. Robson. F.). Morden Carr, but near houses, and perhaps introduced (M. A. Lawson).

2. *I. pseudacorus*, L. Native. British type. Area C, N, D. Range 1.

Common in boggy places, ascending the Wooler Water almost to Langlee-ford and the Coquet to Shillmoor (200 yards).

2. CROCUS, *L.*

1. *C. vernus*, L. Alien.

In a field near Alnwick (T.). Established with *C. aureus* in the park at Seaton Delaval (W. H. Brown.)

Order 3. AMARYLLIDACEÆ.

1. NARCISSUS, *L.*

1. *N. biflorus*, Curt. Alien.

In a field below Windy Edge near Alnwick (R. Embleton. T.). Gathered also by E. Robson near Dinsdale.

2. *N. pseudo-narcissus*, L. Native? English type. Area N, D.

Probably wild in some of the stations, but not in any that we ourselves have had the opportunity of seeing. We should judge it, from the accounts we have received, to be so on the banks of the Derwent at Allansford. It is reported also in the Flora from meadows near Butsfield and Barley Haugh near Ebchester, and woods at Cocken and Witton-le-Wear. The common garden

plant is not the true *pseudo-narcissus*, but *N. major*, Curt., *N. grandiflorus*, Salisb. (Bot. Mag., t. 51), which has larger flowers, almost sessile in the spathe, a shorter tube, broader leaves, a less compressed stem, and the segments of the perianth similar in colour to and slightly shorter than the crown.

2. GALANTHUS, *L.*

1. *G. nivalis*, L. Alien.

Not unfrequent in plantations and near villages. Well established on the banks of a stream above Hawkhill Tile Sheds near Alnwick (T.).

3. LEUCOJUM, *L.*

1. *L. æstivum*, L. Alien.

Formerly subspontaneous near a pond in Heaton Dene, but destroyed long ago.

Order 4. LILIACEÆ.

1. TULIPA, *L.*

1. *T. sylvestris*, L. Alien.

On the site of an old garden at Blackwell near Darlington with *Ornithogalum nutans* (James Backhouse).

2. ALLIUM, *L.*

1. *A. scorodoprasum*, L. Native. Intermediate type. Area N, D. Range 1.

Grassy places, rare. By the Tyne near Benwell (F. R!). Castle Eden Dene, Hesleden Dene, and gathered by John Thompson near Middleton-one-Row.

2. *A. oleraceum*, L. Native. Germanic type. Area C, N, D. Range 1.

On the basalt at Ratcheugh, Howick, Spindlestone, and Holy Island. In the Wansbeck tract on rocks at Harnham, and by the Hart between Hartburn Grange and the moor (F.). In

Durham at Wylam, Silksworth, Durham Park, Middleton Teesdale, Darlington, and Middleton-one-Row. Ascends to 150 yards.

3. *A. vineale*, L. Native. English type. Area C, N, D. Range 1.

Grassy places, rare. Pastures at Lesbury and banks of the Aln below Denwick Bridge (T.). On the basalt near Belford and on Gunnerton Crags, 150 yards (F. B.). Durham Peth (Rev. J. T. Fenwick. F.). Baydales near Darlington (W. Backhouse. F.).

4. *A. schœnoprasum*, L. Native. Local type. Area C, N. Range 1.

Along the basaltic dike by way of Walltown, Crag Lake, Kirkwhelpington, and Bavington, to Spindlestone, but now nearly or quite extinct in some of the old stations. Range 150–250 yards.

5. *A. ursinum*, L. Native. British type. Area C, N, D. Range 1, 2.

Frequent in woods and thickets, ascending to Heathpool Linn, Tecket Dene, and in Weardale to Elm Ford Woods near Wearhead village, 350 yards.

3. LILIUM, *L.*

1. *L. martagon*, L. Alien.

In the woods at Hulne and Hunwick (T.).

4. GAGEA, *Salisb.*

1. *G. lutea*, Ker. Native. Intermediate type. Area C, N, D. Range 1.

Woods and thickets, rare. In the dene near Twizell House (P. J. Selby), Rugley Wood near Alnwick (T.), in the Wansbeck tract at Hartburn (Rev. W. Featherstonhaugh), and by the Hart below Rothley Mill (Sir W. C. Trevelyan). Simonburn Dene (Wallis), and on the east side of the North Tyne at Howford Banks near Warden (R. Wigham!). Whinetly Burn,

plentiful (G. C. Atkinson!). In Durham in woods near Halton Castle and Bishop Auckland, and by the Tees in several places from Eglestone down to Darlington. Range of altitude, 0–250 yards.

5. ORNITHOGALUM, *L.*

1 *O. nutans*, L. Alien. See *Tulipa*.

6. SCILLA, *L.*

1. *S. verna*, L. Native. Maritime. Atlantic type. Area C. Range 1.

In the basalt on the coast near Howick and between Craster and Dunstanbro' (R. Embleton. T.).

7. HYACINTHUS, *L.*

1. *H. non-scriptus*, L. Native. British type. Area C, N, D. Range 1, 2.

Common in woods and thickets, ascending to 350 yards in Goldscleugh, and as high in Teesdale.

8. RUSCUS, *L.*

1. *R. aculeatus*, L. Alien.

Hedge-bank at Cockerton near Darlington, close to the village (J. Backhouse). In the plantations at Hulne and Howick (T.).

9. CONVALLARIA, *L.*

1. *C. bifolia*, L. Alien.

In the plantations at Howick (R. Embleton!).

2. *C. verticillata*, L. Native. Scottish type. Area N. Range 1.

In North Tynedale on a wooded bank near Smalesmouth (R. Makepeace!). Probable altitude about 200 yards.

3. *C. majalis*, L. Native. Xerophilous. Germanic type. Area N, D. Range 1, 2.

Not known in Cheviot-land. In the Wansbeck tract in Chapel

Wood near Morpeth (W. Richardson). In Tynedale near Warden Mills, Gibside Woods, and in Denton and Scotswood Denes (F. R!). In the Wear district in Shull Woods near Wolsingham (Jas. Backhouse). In Teesdale in High Force Wood (350 yards), and by the river side at Winch Bridge. In the magnesian limestone tract in Hesleden and Castle Eden Denes.

4. C. *multiflora*, L. Native? English type. Area N. Range 1.

Woods at Blagdon (G. S. Brady) and at Stannington Bridge on the Blyth (R. B. Bowman!). Gathered long ago by E. Robson in the lane between Stainton and Stockton.

5. *C. polygonatum*, L. Native. English type. Area C. Range 1.

On the basaltic crags at Kyloe, 150 yards, discovered about the beginning of the century by Arthur Bruce.

Order 5. TRILLIACEÆ.

1. PARIS, *L.*

1. *P. quadrifolia*, L. Native. British type. Area C, N, D. Range 1, 2.

Frequent in shaded woods, from the denes of the coal country and Magnesian Limestone upwards, ascending in Teesdale to 350 yards near the High Force.

Order 6. DIOSCOREACEÆ.

1. TAMUS, *L.*

1. *T. communis*, L. Native. English type. Area N, D. Range 1.

Only just passes the Tyne in a northern direction, having been gathered by John Thornhill and others in Heaton Dene. Frequent from the Wear to the Tees in the low country; plentiful in thickets on the north side of the river between Southwick

and Hylton Ferry, Ryhope Dene, Hesleden Dene, Dalton Dene, Hawthorn Dene, Castle Eden Dene, and about Hartlepool and Stockton.

Order 7. MELANTHIACEÆ.

1. COLCHICUM, *L.*

1. *C. autumnale*, L. Native. English type. Area D. Range 1.

Damp meadows, very rare. By the Wear at Butterby near Durham (G. T. Fox. F!). By the Tees opposite Eglestone, 200 yards (Rev. J. Harriman!): this may be in Yorkshire. Gathered long ago by W. Weighell near Darlington, but not seen recently.

2. TOFIELDIA, *Huds.*

1. *T. palustris*, Huds. Native. Highland type. Area D. Range 1.

By the side of the streams that run from the Widdy Bank plateau down to the Tees, 400–500 yards.

Order 8. HYDROCHARIDACEÆ.

1. HYDROCHARIS, *L.*

1. *H. morsus-ranæ*, L. Native. English type. Area D. Range 1.

Ditch behind St. Anthony's ballast hills (F.). In a pond near Ryton (T. Belt!). In the ditches in Morden Carr (Rev. A. M. Norman).

2. STRATIOTES, *L.*

1. *S. aloides*, L. Alien.

Ponds at Wallington and north of Cambo (F.).

3. ANACHARIS, *Rich.*

1. *A. alsinastrum*, Bab. Alien.

In the Aln above Denwick Bridge (T.). Fardingslake near

Marsden, where it has appeared within the last two years (G. S. Brady).

Order 9. ALISMACEÆ.

1. ALISMA, *L.*

1. *A. plantago*, L. Native. British type. Area C, N, D. Range 1.

Frequent in ponds in the low country, ascending to the Till at Wooler.

2. *A. ranunculoides*, L. Native. British type. Area C, N, D. Range 1.

Bogs and pond sides, not uncommon. Holy Island, Alnmouth, Alnwick Moor, Dunstanbro', Spindlestone, Prestwick Carr, Monkton, Marsden, Fardingslake, Whitburn, East Morton, Barnard Castle, &c.

2. SAGITTARIA, *L.*

1. *S. sagittifolia*, L. Native. English type. Area D. Range 1.

In Billingham Beck, and some of the ditches near the Tees below Stockton (F. R!).

2. BUTOMUS, *L.*

1. *B. umbellatus*, L. Native. English type. Area D. Range 1.

Planted at Beadnell, Howick, and Wallington. With the preceding in its stations near the Tees mouth. In the Skerne at Houghton-le-Skerne (M. A. Lawson). Gathered by the Rev. J. Symons in the Browney.

3. TRIGLOCHIN, *L.*

1. *T. maritimum*, L. Native. Maritime. British type. Area C, N, D. Range 1.

Frequent in salt marshes all along the coast.

2. *T. palustre*, L. Native. British type. Area C, N, D. Range 1–3.

Frequent in damp grassy places, ascending to 500 yards in Teesdale, 600 yards in West Allendale, 650 yards in Harwood Dale.

Order 10. FLUVIALES.

1. POTAMOGETON, *L.*

1. *P. densus*, L. Native. English type. Area N, D. Range 1.

Pond at Walker (F.) and near Howdon Pans (Jno. Storey!). Ponds at Hebburn and in a spring at Manhaven near Marsden (F. R.). In the Wear below Whitworth (Miss Wharton). In the Skerne at Darlington (F.).

2. *P. pectinatus*, L. Native. British type. Area C, N, D. Range 1.

In the Tweed and Wear, the Serpentine at Hardwick, Holy Island Lough, Meggy's Burn near Blyth, and salt water ditches at Hylton and the Tees mouth, and ascending to Crag Lough, 200 yards.

3. *P. pusillus*, L. Native. British type. Area C, N, D. Range 1.

Frequent in ditches and slow streams, ascending to Kemmer Lough near Eglingham, 200 yards (T.). A very slender-leaved variety gathered by Professor Oliver near Dunstanbro'.

4. *P. gramineus*, L. (*P. compressum*, Flora.) Native. English type. Area C, N, D. Range 1.

Learmouth Bog near Cornhill (R. Embleton). Crag Lake, 200 yards, Prestwick Carr, and ponds at Widehaugh near Dilston (F. R!). Salt water ditches at Seaton Carew, and in a pond near Darlington (W. Backhouse. F!).

5. *P. crispus*, L. Native. British type. Area C, N, D. Range 1.

Frequent in ditches and slow streams, ascending to the Till at Wooler, in Coquetdale to Rothbury, in Weardale to Stanhope, 200 yards.

6. *P. perfoliatus*, L. Native. British type. Area C, N, D. Range 1.

Frequent in slow streams, ascending to Crag Lough, 200 yards.

7. *P. lucens*, L. Native. English type. Area C, N, D. Range 1.

Plentiful in the Tweed, especially about the Union Bridge (Dr. Johnston). In the Aln and ponds near Alnwick (R. Embleton). In Tynedale in Crag Lake, 200 yards, the lake at Dudley Shiels, the mill-race at Hexham, and Prestwick Carr (F. R!). Ponds near Darlington, and in the Skerne (W. Backhouse. F!).

8. *P. prælongus*, Wulf. Native. Scottish type. Area C. Range 1.

Mentioned in the Transactions of the Berwick Clnb for 1854 as having been gathered in the Tweed near the Union Bridge.

9. *P. heterophyllus*, Sieb. Native. British type. Area N, D. Range 1.

In Tynedale in Haltwhistle Burn below Walltown (W. H. Brown!). Prestwick Carr (F. R!). Pools near the Wescrow Burn in Waskerley Park (F.).

10. *P. rufescens*, Schrad. Native. British type. Area C, N, D. Range 1, 2.

Ponds on Alnwick Moor (J. Davidson. F!). Swinhoe Lough, and in the pond below Kyloe Crags (R. Embleton). Crag Lough and Greenley Lough (R!). In the Weel with *Ranunculus peltatus* at an elevation of 500 yards (B.).

11. *P. natans*, L. Native. British type. Area C, N, D. Range 1.

Common in ponds in the low country, ascending in Coquetdale above Rothbury, 150 yards.

12. *P. oblongus*, Viv. Native. British type. Area C, N, D. Range 1, 2.

Frequent in peaty pools, especially amongst the moors, ascending in Teesdale to 500 yards.

13. *P. plantagineus*, Ducr. Native. English type. Area C, D. Range 1.

In a pond near Dunstanbro' (Professor Oliver! T.). Ditches at Alnmouth (T.). Hell Kettles near Croft (F. B.). The three stations mentioned under "*P. fluitans*" in the Flora belong one each to this, *P. oblongus* and *P. rufescens*.

2. RUPPIA, *L.*

1. *R. maritima*, L. Native. Maritime. British type. Area C, N, D. Range 1.

Salt water ditches, rare. Warren Mills, in the Coquet near Warkworth, Meggy's Burn, Tees mouth, &c.

3. ZANNICHELLIA, *L.*

1. *Z. palustris*, L. Native. British type. Area C, N, D. Range 1.

Ditches and slow streams, frequent. Var. *pedicellata*, Fries. at the mouth of Meggy's Burn, Willington Burn, &c.

4. ZOSTERA, *L.*

1. *Z. marina*, L. Native. Maritime. British type. Area C, N, D. Range 1.

All along the coast in the sea, but not very frequent.

2. *Z. nana*, Roth. Native. Maritime. English type. Area N, D. Range 1.

Gathered in plenty at Blyth by John Storey, at Hartlepool by Albany Hancock, and at Seaton Carew by W. Backhouse.

Order 11. ARACEÆ.

1. LEMNA, *L.*

1. *L. minor*, L. Native. British type. Area C, N, D. Range 1.

Everywhere common in ponds and ditches in the low country.

2. *L. trisulca*, L. Native. English type. Area C, N, D. Range 1.

Ponds and ditches, not known in Cheviot-land. Prestwick Carr, Wolsington, Hebburn, Tynemouth, Newcastle, Boldon, Ryton, Sunderland, Darlington, Stockton, &c.

2. ARUM, *L.*

1. *A. maculatum*, L. Native. English type. Area C, N, D.

Very rare in Cheviot-land, and doubted by Dr. Tate as a native. It occurs at Greensfield, Ellingham, and in Hulne Woods. Frequent in hedge-banks and in woods in Tyneland and Durham, ascending in Teesdale to 980 feet.

3. SPARGANIUM, *L.*

1. *S. natans*, L. Native. British type. Area N. Range 1.

The only station from which we have seen a specimen is the burn in Heaton Dene, where the true plant was gathered by John Storey. The old *natans* is now divided into two species, and we do not know to which of them to refer the following records. Watery places amongst the copsewood near Heathpool

Linn (Dr. Johnston). Newham Bog (R. Embleton). Prestwick Carr, and in the Derwent and Team (F.).

2. *S. simplex*, Huds. Native. British type. Area C, N, D. Range 1.

Frequent in ponds and slow streams in the low country.

3. *S. ramosum*, Huds. Native. British type. Area C, N, D. Range 1.

Common in ponds and slow streams, ascending in Coquetdale to Sharperton, Weardale to Stanhope, Teesdale to 200 yards.

4. TYPHA, *L.*

1. *T. latifolia*, L. Native. British type. Area C, N, D. Range 1.

Often associated with the preceding, ascending to Crag Lough and Sweethope Lough, 200 yards.

2. *T. angustifolia*, L. Native. English type. Area N, D. Range 1.

Rare in similar situations. The pond at Friars' Goose, where it used to be gathered in the days of Winch, was drained many years ago, but it is plentiful near the railway about Scotswood, and was gathered many years ago by James Ianson in a pond between Nesham and Darlington.

Order 12. JUNCACEÆ.

1. JUNCUS, *L.*

1. *J. conglomeratus*, L. Native. British type. Area C, N, D.

Common in undrained pastures, ascending to 500 yards in Rookhope and the Derwent district.

2. *J. effusus*, L. Native. British type. Area C, N, D. Range 1–3.

The commonest of the rushes, ascending to 550 yards in Cheviot and 700 yards in Highfield and Kilhope Law.

3. *J. glaucus*, Sibth. Native. British type. Area C, N, D. Range 1, 2.

Common in damp places, ascending in the Wear district to 400 yards near Copthill.

4. *J. diffusus*, Hoppe. Native. English type. Area C, N. Range 1.

Doubtless often passed over as the preceding. It has been seen by Professor Oliver and J. G. Baker in Coquetdale near Alwinton, and on the slope of Simonside, 250 yards; in South Tynedale at Thorngrafton, at Cramlington, and on Newcastle Town Moor.

5. *J. maritimus*, Sm. Native. Maritime. British type. Area C, N, D. Range 1.

Scattered along the coast in inundated places. Alnmouth, Embleton, Blyth, Hartlepool, Seaton Carew, &c.

6. *J. acutiflorus*, Ehrh. Native. British type. Area C, N, D. Range 1, 2.

Common in swampy fields and thickets, ascending to 450 yards at the head of the Broadstruther Burn, Cheviot, and to 500 yards in Rookhope and Langdon Dale.

7. *J. lamprocarpus*, Ehrh. Native. British type. Area C, N, D. Range 1–3.

Common in damp grassy places, ascending to 550 yards on Cheviot, 650 yards on Highfield. Var. *nigritellus*, Don. was gathered in South Tynedale by John Thompson, in Lipwood Moss and in a swamp near the Bourn House.

8. *J. obtusiflorus*, Ehrh. Native. English type. Area N, D. Range 1.

Low-country swamps, rare. Gathered formerly in Prestwick Carr and at Polam near Darlington. Still plentiful at Hell Kettles, on the Durham side of the Tees opposite Croft.

9. *J. supinus*, Moench. Native. British type. Area C, N, D. Range 1–3.

Common on the edges of ponds, especially amongst the moors, ascending to 550 yards on Cheviot, 600 yards on Stangend Rigg, 700 yards on Highfield.

10. *J. compressus*, Jacq. Native. Maritime. British type. Range 1.

The maritime form (*J. cænosus*, Bich.) is very common in inundated places all along the coast. We have not seen the typical inland plant anywhere in the province, and the station given by Winch is a mistake.

11. *J. bufonius*, L. Native. British type. Area C, N, D. Range 1, 2.

Common in damp places, ascending to 500 yards in Rookhope, 550 yards above Allenheads.

12. *J. squarrosus*, L. Native. British type. Area C, N, D. Range 1–3.

Common on damp moors, ascending to the peaks of all the hills, 850 yards on Cheviot.

13. *J. triglumis*, L. Native. Highland type. Area D. Range 2.

On Widdy Bank Fell, both upon the sides towards the Weel and that towards Widdy Bank House. Range of altitude 500–550 yards.

14. *J. castaneus*, Sm. Alien.

There is a specimen in the Smithian Herbarium marked as sent from the county of Durham by the Rev. J. Harriman.

2. LUZULA, *D. C.*

1. *L. sylvatica*, Bich. Native. British type. Area C, N, D. Range 1–3.

Common in woods amongst the hills and on the edge of heaths,

ascending to 850 yards on Cheviot, 550 yards in Harwood Dale, and West Allendale.

2. *L. pilosa*, Willd. Native. British type. Area C, N, D. Range 1, 2.

Common in heathy places, ascending to 500 yards at Allenheads.

3. *L. campestris*, R. Br. Native. British type. Area C, N, D. Range 1–3.

Everywhere common in grassy places, ascending to 700 yards on Highfield.

4. *L. multiflora*, Lej. Native. British type. Area C, N, D.

Grassy heaths, frequent, ascending to 850 yards on Cheviot, 750 yards on Highfield.

3. NARTHECIUM, *L.*

1. *N. ossifragum*, L. Native. British type. Area C, N, D. Range 1, 2.

Frequent in swamps amongst the moors, descending to Prestwick Carr, ascending to 550 yards in Cheviot, and at the head of the Beldon Burn, 550 yards in Welhope.

Division 2. GLUMIFERÆ.

Order 1. CYPERACEÆ.

1. CLADIUM, *R. Br.*

1. *C. mariscus*, R. Br. Native. English type. Area C. D. Range 1.

Plentiful in Learmouth Bog near Cornhill, where it was first gathered by Dr. F. Douglas in 1837, and at Hell Kettles near Darlington.

2. SCHŒNUS, *L.*

1. *S. nigricans*, L. Native. British type. Area C, N, D. Range 1.

Swampy heaths, not unfrequent. Berwick, Learmouth Bog,

Newham Lough, Alnmouth, Howick, Prestwick Carr, Follingsby, Murton Moor, Hartlepool, Norton, Darlington, &c.

3. RHYNCHOSPORA, *Vahl.*

1. *R. alba*, Vahl. Native. British type. Area N, D. Range 1.

Swampy heaths, rare. Muckle Moss, 150 yards, Prestwick Carr, and Beamish Moor.

4. BLYSMUS, *Panz.*

1. *B. compressus*, Panz. Native. English type. Area C, N, D. Range 1, 2.

In Cheviot-land known only amongst the coast links at Bambro' and Holy Island. In Tyneland at Smalesmouth, Chollerford, Nunwick, by the Wansbeck at Morpeth, and the Tyne at Newburn. In Durham, ascending from the coast to 500 yards in Teesdale on the slope of Widdy Bank Fell.

2. *B. rufus*, Link. Native. Maritime. Scottish type. Area C, D. Range 1.

Salt marshes along the coast. Abundant at the mouth of the Low below Beal (R. Embleton). Warren Mills near Budle (Professor Oliver). Howick and Alnmouth (T.). About the mouth of the Wear, and gathered also by the Rev. J. Dalton near Hartlepool.

5. SCIRPUS, *L.*

1. *S. lacustris*, L. Native. British type. Area C, N, D. Range 1.

Ponds and slow stream-sides, frequent, ascending in Redesdale to Corsenside, 150 yards (Professor Oliver).

2. *S. glaucus*, Sm. Native. Maritime. English type. Area N, D.

Salt-water ditches. About the mouth of the Wansbeck, Cowpen near Blyth, Hartlepool, Tees mouth. To this belongs the *S. carinatus* of Winch's Flora.

3. *S. setaceus*, L. Native. British type. Area C, N, D. Range 1.

Frequent in inundated places, ascending in Coquetdale to Harbottle Lough, 300 yards (W. H. Brown).

4. *S. maritimus*, L. Native. Maritime. British type. Area C, N, D. Range 1.

Frequent all along the coast at the mouths of the streams.

5. *S. sylvaticus*, L. Native. British type. Area C, N, D. Range 1.

Stream-sides in the low country, not unfrequent, ascending in North Tynedale above Bellingham (W. H. Brown), and in Coquetdale to Netherton, 150 yards.

6. *S. palustris*, L. Native. British type. Area C, N, D. Range 1.

Stream-sides and at the edges of ponds, frequent, ascending in Redesdale to Otterburn (W. H. Brown), and Coquetdale to Rothbury, 150 yards.

7. *S. uniglumis*, Link. Native. Scottish type. Area C, N. Range 1.

Gathered by Professor Oliver on the coast at Dunstanbro' and the mouth of Meggy's Burn near Blyth.

8. *S. multicaulis*, Sm. Native. British type. Area C, N.

Plentiful on the shore between Warren Mills and Budle with *Blysmus rufus* (Dr. Johnston), and with *Eriophorum latifolium* on the bank of the stream between Lowick and Kyloe Crags (B.). Prestwick Carr (F. R!).

9. *S. pauciflorus*, Light. Native. British type. Area C, N, D. Range 1.

Heathy bogs, descending to Willington, Hylton, and Darlington, ascending to the Alwinton Moors, and 500 yards on Widdy Bank.

10. *S. cæspitosus*, L. Native. British type. Area C, N, D. Range 1, 2.

Damp moors, common, ascending to 500 yards on Cheviot, 550 yards in Welhope.

11. *S. acicularis*, L. Native. English type. Area N.

Gathered by Mr. Embleton near Alnwick, but the pond is now drained, and by Professor Oliver by the Tyne side below Wylam.

12. *S. fluitans*, L. Native. British type. Area C, N, D. Range 1.

On the moors west of Belford (Thompson), Alnwick Town Ponds (R. Embleton), Broomley Lough, 200 yards (John Thompson!), Rothley Lake (Sir W. C. Trevelyan), Prestwick Carr, and in a pond at Forest Hall (F. R!). Ditches near Cleadon and Darlington (F.).

6. ERIOPHORUM, *L.*

1. *E. vaginatum*, L. Native. British type. Area C, N, D. Range 1–3.

Common on swampy heaths, ascending to 850 yards on Cheviot, 750 yards on Highfield.

2. *E. angustifolium*, Roth. Native. British type. Area C, N, D. Range 1–3.

Common in similar places to the preceding, ascending to 850 yards on Cheviot, 700 yards on Highfield and Kilhope Law.

3. *E. latifolium*, Hoppe. Native. British type. Area C, N, D. Range 1, 2.

Not unfrequent in bogs, ascending from Prestwick Carr and some of the Magnesian Limestone denes to Alwinton Moor, Horsley Moor near Rochester, and in Teesdale to 500 yards on Widdy Bank.

7. ELYNA, *Schrab.*

1. *E. caricina*, M. and K. Native. Intermediate type. Area D. Range 2.

Plentiful on Widdy Bank, from the plateau down to the Tees, 400–550 yards.

8. CAREX, *L.*

1. *C. dioica*, L. Native. Scottish type. Area C, N, D. Range 1, 2.

Not unfrequent in swamps, ascending to 550 yards in Teesdale.

2. *C. pulicaris*, L. Native. British type. Area C, N, D. Range 1, 2.

Common on damp heaths, ascending to 550 yards on Cheviot and in Welhope.

3. *C. pauciflora*, Light. Native. Highland type. Area N. Range 1.

In South Tynedale, in Muckle Moss and in a peat bog between the "Twice Brewed Ale" public house and the south-west end of Crag Lough, 150–250 yards (F. R!).

4. *C. stellulata*, Good. Native. British type. Area C, N, D. Range 1–3.

Common in swamps, ascending to 800 yards on Cheviot, 650 yards on Highfield.

5. *C. ovalis*, Good. Native. British type. Area C, N, D. Range 1, 2.

Frequent in damp ground, ascending to 450 yards on the banks of the Knucton Burn, 550 yards in Welhope and East Allendale.

6. *C. curta*, Good. Native. British type. Area C, N, D. Range 1, 2.

Frequent in swamps, ascending to Wooler Common, the banks of the Weel, 500 yards, and to 600 yards above Allenheads.

7. *C. remota*, L. Native. British type. Area C, N, D. Range 1.

Ditches and damp woods, frequent, ascending to Langlee-ford, Smalesmouth, Tecket Dene, and 1000 feet in Teesdale.

8. *C. intermedia*, Good. Native. English type. Area C, N, D. Range 1.

Damp grassy places, frequent, ascending in Coquetdale above Alwinton, 200 yards.

9. *C. arenaria*, L. Native. Maritime. British type. Area C, N, D. Range 1.

Common along the coast sand-hills. Inland in Cawsey Dene near Tanfield (W. H. Brown!).

10. *C. muricata*, L. Native. British type. Area C, N, D. Range 1.

Frequent on dry banks, ascending in Coquetdale to the porphyry above Alwinton, 250 yards.

11. *C. divulsa*, Good. Incognit.

Reported in the Flora from Darlington as gathered by W. Backhouse, but we fear some mistake, as there was no specimen in his collection, and in his Herbarium Winch seems to have confused this with the preceding.

12. *C. vulpina*, L. Native. British type. Area C, N, D. Range 1.

Frequent in ditches and swamps in the low country.

13. *C. teretiuscula*, Good. Native. British type. Area C. Range 1.

Low country bogs, rare. Learmouth Bog near Cornhill, and Newham Bog near Bambro'.

14. *C. paniculata*, L. Native. British type. Area C, N, D. Range 1.

Not unfrequent in bogs, ascending to the foot of Yevering Bell, 150 yards.

15. *C. rigida*, Good. Native. Highland type. Area C, D. Range 2, 3.

Plentiful about the peak of Cheviot. In Teesdale on a moor near the Caldron Snout (Sir W. C. Trevelyan. F!). Range 550–850 yards.

16. *C. vulgaris*, Fries. Native. British type. Area C, N, D. Range 1–3.

Everywhere common in inundated places, ascending to 750 yards on Highfield.

17. *C. stricta*, Good. Native. English type. Area N, D. Range 1.

Reported in the Flora from Heaton Dene and a marsh near St. Anthony's ballast hills, but we have never seen Northumbrian specimens, and the station of Westcrow Wood near Wolsingham is no doubt a mistake. In Durham we have seen the true plant in plenty at Hell Kettles near Croft, and received it from the Rev. A. M. Norman from Red Carr near Sedgefield.

18. *C. acuta*, L. Native. British type. Area C, N, D. Range 1.

Frequent by stream-sides and in swamps in the low country.

19. *C. flava*, L. Native. British type. Area C, N, D. Range 1, 2.

Frequent in inundated places, ascending to 550 yards on Cheviot, 600 yards on Highfield and Kilhope Law.

20. *C. extensa*, Good. Native. Maritime. British type. Area C, D. Range 1.

Salt marshes, not unfrequent. On the beach north of the village on Holy Island (Thompson), Warren Mills near Budle (Professor Oliver and W. H. Brown!), Howick and Alnmouth (T.). In Durham about the mouth of the Wear, and at Hartlepool and Seaton Carew.

21. *C. pallescens*, L. Native. British type. Area C, N, D. Range 1, 2.

Frequent in damp grassy places, ascending to 450 yards in Dunsdale and Teesdale, 400 yards in Burnhope.

22. *C. fulva*, Good. Native. British type. Area C, N, D. Range 1, 2.

Not unfrequent in swampy places amongst the hills, ascending in Teesdale to the Widdy Bank plateau, 500 yards. In the low country in Prestwick Carr, Birch Carr, bogs at Ryhope and Hylton, &c.

23. *C. distans*, L. Native. Maritime. British type. Area C, N, D. Range 1.

Not unfrequent along the coast. Warren Mills, Alnmouth, Howick, mouths of the Coquet, Tyne, Wear, and Tees.

24. *C. binervis*, Sm. Native. British type. Area C, N, D. Range 1, 2.

Frequent on damp moors, ascending to 500 yards in Burnhope and on Cheviot.

25. *C. lævigata*, Sm. Native. British type. Area C, N. Range 1, 2.

Frequent in the Cheviot tract up to 350 yards. Goldscleugh, banks of the Common Burn and Wooler Water, in the wood on the slope of the Yevering Bell, Chillingham Woods, Linhope Spout, and by the Breamish near Bleakhope. In North Tynedale, gathered by R. Makepeace near Bellingham.

26. *C. panicea*, L. Native. British type. Area C, N, D. Range 1–3.

Everywhere common in inundated grassy places, ascending to 750 yards on Highfield, 550 yards on Cheviot.

27. *C. capillaris*, L. Native. Highland type. Area D. Range 2.

In Teesdale on the Widdy Bank plateau, and by the streams down to the Tees, 400–550 yards.

28. *C. limosa*, L. Native. Scottish type. Area C, N. Range 1.

Haiden Dene near Berwick, and Learmouth Bog near Cornhill (Dr. Johnston). On the moors near Wallington (Sir W. C. Trevelyan. F!), and in Baron House Bog (F!). Range 0–200 yards.

29. *C. irrigua*, Sm. Native. Scottish type. Area N. Range 1.

In South Tynedale in the Muckle Moss near Thorngrafton, 150 yards, where it was first gathered by John Thompson.

30. *C. sylvatica*, Huds. Native. British type. Area C, N, D. Range 1.

Frequent in woods and thickets, ascending to Langlee-ford, Hareshaw Dene, and 350 yards in Teesdale.

31. *C. pendula*, Huds. Native. British type. Area C, N, D. Range 1.

Damp woods. Twizell Dene (P. J. Selby). Cauledge Woods near Alnwick, and by the Coquet at Warkworth (T.). By the Wansbeck at Bothal (Miss Trevelyan). In most of the lower Tyne denes, as Walbottle, Scotswood, Denton, and in Ravensworth and Gibside Woods. In Beamish and Urpeth Woods, and by the Wear near Southwick (F. R.).

32. *C. glauca*, Scop. Native. British type. Area C, N, D. Range 1–3.

Everywhere common both in damp and dry grassy places, ascending to 700 yards on Highfield.

33. *C. præcox*, Jacq. Native. British type. Area C, N, D. Range 1.

Frequent on dry banks, ascending in Coquetdale to 200 yards. "Teesdale Forest," Robertson in herb.

34. *C. pilulifera*, L. Native. British type. Area C, N, D. Range 1, 2.

Frequent in damp grassy places, ascending to 1600 feet in Harwood Dale, 600 yards on Cheviot.

35. *C. filiformis*, L. Native. Scottish type. Area C, N.

Newham Bog near Bambro' (T.). Baron House Bog near Wardrew, 150 yards (R!).

36. *C. hirta*, L. Native. British type. Area C, N, D. Range 1, 2.

Common in damp meadows, ascending to 350 yards in Weardale, 400 yards in Teesdale.

37. *C. ampullacea*, Good. Native. British type. Area C, N, D. Range 1, 2.

Frequent in swamps, especially amongst the hills, ascending to 450 yards at the head of Broadstruther Burn, Cheviot, 500 yards in Teesdale and Rookhope, 600 yards in Kilhope.

38. *C. vesicaria*, L. Native. British type. Area C, N, D. Range 1.

Frequent in swamps in the low country, ascending to Muckle Moss and Crag Lough, 200 yards.

39. *C. paludosa*, Good. Native. British type. Area C, N, D. Range 1, 2.

Frequent by stream-sides and in swamps, ascending to 400 yards in Weardale near Wearhead village.

40. *C. riparia*, Curt. Native. British type. Area C, N, D. Range 1.

Frequent in the low-country swamps, ascending to Hulne and Rugley Woods near Alnwick, 100 yards (T.).

Order 2. GRAMINEÆ.

1. PHALARIS, *L.*

1. *P. arundinacea*, L. Native. British type. Area C, N, D. Range 1, 2.

Common by streams and in swamps, ascending to 350 yards in Irishope, 450 yards in East Allendale.

2. *P. canariensis*, L. Alien.

An occasional weed of cultivated ground, seen at 550 yards in East Allendale.

2. ANTHOXANTHUM, *L.*

1. *A. odoratum*, L. Native. British type. Area C, N, D. Range 1–3.

Everywhere common in grassy places, ascending to 850 yards on Cheviot, 750 yards on Highfield.

3. PHLEUM, *L.*

1. *P. pratense*, L. Native. British type. Area C, N, D. Range 1, 2.

Cultivated fields and grassy places, common, ascending to 400 yards in Harthope, 450 yards in East Allendale.

2. *P. arenarium*, L. Native. Maritime. English type. Area C, N, D. Range 1.

Frequent in sandy ground all along the coast.

4. ALOPECURUS, *L.*

1. *A. pratensis*, L. Native. British type. Area C, N, D. Range 1–3.

Common in grassy places, ascending to 650 yards in Harwood Dale, 550 yards in East and West Allendale.

2. *A. geniculatus*, L. Native. British type. Area C, N, D. Range 1–3.

Common in swamps and on the edges of ponds, ascending to 650 yards on Highfield, 600 yards on Stangend Rigg. The plant called *A. bulbosus* in Winch's Flora is only a salt-marsh state of this.

3. *A. agrestis*, L. Colonist. English type. Area N, D. Range 1.

Cultivated fields, principally on the Magnesian Limestone, and not known in Cheviot-land.

5. MILIUM, *L.*

1. *M. effusum*, L. Native. British type. Area C, N, D. Range 1.

Shaded woods, not unfrequent. Rugley Wood, Tyneside denes, by the Wear at Durham, &c.

6. APERA, *Adans.*

1. *A. spicaventi*, Beauv. Colonist. Germanic type. Area N, D. Range 1.

Cultivated fields, very rare. Heaton Dene, North Shields, Windmill Hills, Gateshead, and near Beamish Mill (F!).

7. AGROSTIS, *L.*

1. *A. canina*, L. Native. British type. Area C, N, D. Range 1, 2.

Not unfrequent in swamps, ascending to 500 yards in the Brizzle ravine of Cheviot (W. H. Brown!).

2. *A. vulgaris*, With. Native. British type. Area C, N, D. Range 1–3.

Everywhere common in grassy places, ascending to 750 yards on Highfield, 850 yards on Cheviot. The Var. *pumila*, Light. is common on the moorland roads.

3. *A. alba*, L. Native. British type. Area C, N, D. Range 1.

Frequent in swamps, especially along the coast in the salt-marshes.

8. AMMOPHILA, *Host.*

1. *A. arundinacea*, Host. Native. Maritime. British type. Area C, N, D. Range 1.

Common amongst the sand-hills all along the coast.

9. ARUNDO, *L.*

1. *A. phragmitis*, L. Native. British type. Area C, N, D. Range 1.

Common in ditches and by stream-sides, ascending in Coquetdale to Rothbury, 150 yards.

2. *A. calamagrostis*, L. Native. English type. Area C.

White House Wood near Alnwick (W. Richardson! T.).

3. *A. epigejos*, L. Native. English type. Area C, N, D.

White House Wood near Alnwick (T.). Moss near the Routing Linn, Doddington (A.). By the Tyne at Hebburn and Warden Mills (F!). North branch of Castle Eden Dene (F!).

10. SESLERIA, *Scop.*

1. *S. cærulea*, Scop. Native. English type. Area C, D. Range 1, 2.

Not known amongst the Cheviots, and gathered in Northumberland only on the limestone at Ratcheugh Crag near Alnwick. In Durham frequent on the Magnesian Limestone, descending as at Marsden to the coast cliffs, and frequent in Teesdale on the limestone scars from Eglestone up to 550 yards in Harwood Dale and on Newbiggen Moor.

11. AIRA, *L.*

1. *A. cæspitosa*, L. Native. British type. Area C, N, D. Range 1–3.

Common by stream-sides, and in meadows ascending to 650 yards on Cheviot and Highfield. The plant called *A. alpina* in Winch's Flora is no doubt a mistake.

2. *A. flexuosa*, L. Native. British type. Area C, N, D. Range 1–3.

Common on heaths, ascending to all the high peaks, 850 yards on Cheviot.

3. *A. caryophyllea*, L. Native. British type. Area C, N, D. Range 1.

Frequent in sandy ground, ascending Coquetdale to Alwinton, Redesdale to Rochester, Teesdale to 300 yards near Middleton.

4. *A. præcox*, L. Native. British type. Area C, N, D. Range 1, 2.

Frequent on sandy heaths, ascending to 500 yards in Rookhope and East Allendale.

12. AVENA, *L.*

1. *A. fatua*, L. Colonist. British type. Area C, N, D. Range 1.

A common weed in cultivated fields, ascending in Coquetdale to Alwinton, Weardale to Frosterley, 200 yards.

2. *A. strigosa*, Schreb. Colonist. British type. Area C, D. Range 1, 2.

An occasional weed, but much less frequent than the preceding. Alnwick, Ravensworth, Tanfield, Burnopfield, Sunderland, Castle Eden, St. John's Chapel, 350 yards, Bishop Auckland, &c.

3. *A. pratensis*, L. Native. Xerophilous. British type. Area C, N, D. Range 1, 2.

Frequent on the limestone and porphyry, ascending to Heathpool Linn, Sharperton, and in Harwood to the Main Limestone cliffs, 550 yards.

4. *A. pubescens*, L. Native. British type. Area C, N, D. Range 1–3.

Everywhere common in pastures, ascending to 550 yards in Harwood Dale near Grasshill.

5. *A. flavescens*, L. Native. English type. Area C, N, D. Range 1, 2.

Everywhere common in grassy places, ascending to 550 yards in East Allendale.

13. ARRHENATHERUM, *Beauv.*

1. *A. avenaceum*, Beauv. Native. British type. Area C, N. D. Range 1, 2.

Common upon hedge-banks and in thickets, ascending to 450 yards in East Allendale, 500 yards in Harwood Dale. Var. *bulbosum* is common in dry places.

14. HOLCUS, *L.*

1. *H. lanatus*, L. Native. British type. Area C, N, D. Range 1, 2.

Everywhere common in grassy places, ascending to 550 yards on Cheviot and in East Allendale.

2. *H. mollis*, L. Native. British type. Area C, N, D. Range 1, 2.

Frequent in thickets and woods, ascending to 400 yards in Teesdale, 500 yards in East Allendale.

15. TRIODIA, *R. Br.*

1. *T. decumbens*, Beauv. Native. British type. Area C, N, D. Range 1, 2.

Common in dry places, ascending in Teesdale to 500 yards on Widdy Bank Fell, to 450 yards on Cheviot.

16. KOELERIA, *Pers.*

1. *K. cristata*, Pers. Native. British type. Area C, N, D. Range 1, 2.

Common in dry grassy places, ascending in Teesdale to 500 yards on Widdy Bank Fell.

17. MELICA, *L.*

1. *M. uniflora*, Retz. Native. British type. Area C, N, D. Range 1, 2.

Common in woods and thickets, ascending in Teesdale to 350 yards, and high up in Hareshaw and Tecket Denes.

2. *M. nutans*, L. Native. Xerophilous. Scottish type. Area N, D. Range 1, 2.

Not known in Cheviot-land. In Tyneland in Tecket Dene, Dipton Dene, and by the Irthing at Wardrew (F. R!). Cocken Woods near Durham (Rev. J. Symons. F.). In Teesdale in various places near the river, from Falcon Clints, 450 yards, down to Middleton. In the Magnesian Limestone tract in Castle Eden and Hesleden Denes.

18. MOLINIA, *Schrank.*

1. *M. cærulea*, Mœnch. Native. British type. Area C, N, D. Range 1, 2.

Frequent on damp heaths, ascending to 500 yards in Teesdale and on Cheviot.

19. CATABROSA, *Beauv.*

1. *C. aquatica*, Presl. Native. British type. Area C, N, D. Range 1.

Not unfrequent in swamps and on the edges of ponds. Warren Mills, Alnmouth, Howick, Blyth, Newcastle Town Moor, by the Wear at Hylton, &c.

20. GLYCERIA, *R. Br.*

1. *G. aquatica*, Sm. Native. English type. Area N, D. Range 1.

Ponds and stream-sides, frequent in East Durham, rarer in Tyneland, not known in Cheviot-land.

2. *G. fluitans*, R. Br. Native. British type. Area C, N, D. Range 1, 2.

Common in ponds, slow streams, and swampy places, ascending to 1600 feet in Teesdale, 500 yards in East Allendale.

3. *G. plicata*, Fries. Native. English type. Area C, N, D. Range 1.

In similar places to the preceding, but not ascending so high.

Wooler, Lesbury, Rothbury, Harbottle, Sharperton, Beal, Yevering, Netherton, Morpeth, Blyth, Stanhope at 250 yards, &c.

4. *G. maritima*, M. and K. Native. Maritime. British type. Area C, N, D. Range 1.

Common along the coast in inundated places.

5. *G. distans*, Wahl. Native. English type. Area C, N, D. Range 1.

Along the coast in sandy ground in various places, as at Alnmouth, Cullercoats, Hartlepool, and the Tees mouth and inland on the Magnesian Limestone at Pensher, Whitburn, Castle Eden, &c.

6. *G. procumbens*, Sm. Native. Maritime. English type. Area C, N, D. Range 1.

Not unfrequent in sandy ground, both damp and dry, along the coast. Farne Islands, Cullercoats, South Shields, Whitburn, Fulwell, Sunderland, Hartlepool, Seaton Carew.

7. *G. rigida*, Sm. Native. British type. Area C, D. Range 1.

Amongst the porphyritic debris in the bed of the Cheviot streams at Wooler, &c. (B.). Rocks and walls at Ratcheugh and Holy Island (T.). From Tyneland we have no note of its occurrence. In Durham frequent on the Magnesian Limestone, as at Marsden, Cleadon, Whitburn, East Boldon, Hylton, and over the Ballast Hills.

8. *G. loliacea*, Wats. Native. Maritime. English type. Area C, D. Range 1.

Sandy ground at Newton-by-the-Sea (T.). Above the north sands, Hartlepool (Rev. J. Dalton. F.), and gathered also by E. Robson at Seaton Carew.

21. POA, *L.*

1. *P. annua*, L. Native. British type. Area C, N, D. Range 1–3.

Everywhere common in waste and grassy places, ascending to 800 yards on Cheviot, 750 yards on Highfield.

2. *P. pratensis*, L. Native. British type. Area C, N, D. Range 1–3.

Everywhere common in grassy places, ascending to 750 yards on Highfield.

3. *P. trivialis*, L. Native. British type. Area C, N, D. Range 1–3.

Grassy places and cultivated fields, common, ascending to 650 yards on Cheviot, 600 yards in Harwood Dale, Welhope, and Kilhope.

4. *P. compressa*, L. Native. British type. Area N, D. Range 1.

Walls and dry ground, not unfrequent, ascending in Weardale to Witton-le-Wear, 150 yards (Professor Oliver). Not noted in Cheviot-land, but doubtless overlooked.

5. *P. nemoralis*, L. Native. British type. Area C, N, D. Range 1, 2.

In the Cheviot ravines up to 500 yards, and down to Heathpool Linn, and on the porphyritic cliffs by the Coquet at Windhaugh and Linn Shiels. In the Aln district in Rugley, Hulne, and Calish Woods (T.). In North Tynedale in Tecket Dene (F.). In the Wear district in Cocken Woods (Rev. J. Symons). Var. *Parnellii* in Teesdale on Falcon Clints and rocks in High Force Wood, and by the river side at Winch Bridge and near Eglestone Abbey.

22. BRIZA.

1. *B. media*, L. Native. British type. Area C, N, D. Range 1, 2.

Common in grassy places, ascending to the Main Limestone scars of Welhope, 600 yards, and to 550 yards in Harwood Dale and Teesdale.

23. CYNOSURUS, *L.*

1. *C. cristatus*, L. Native. British type. Area C, N, D. Range 1, 2.

Common in grassy places, ascending to 550 yards in Welhope

and Allendale, 600 yards in Kilhope, 450 yards in the Cheviot tract.

24. DACTYLIS, *L.*

1. *D. glomerata*, L. Native. British type. Area C, N, D. Range 1, 2.

Grassy places and on the edges of fields, ascending to 550 yards in Harwood Dale and East Allendale.

25. FESTUCA, *L.*

1. *F. bromoides*, L. Native. British type. Area C, N, D. Range 1.

Walls and dry sandy banks, not unfrequent. Hareshaw Moor, Tarset Moor, Alnwick Moor, in the Cheviot streams, Alnmouth, &c. Ascends to 200 yards.

2. *F. ovina*, L. Native. British type. Area C, N, D. Range 1–3.

Common in grassy places, especially amongst the moors, ascending to the peak of Cheviot, 850 yards, Highfield, Kilhope Law.

3. *F. duriuscula*, L. Native. British type. Area C, N, D. Range 1–3.

Common in grassy places, ascending to 750 yards on Highfield, 550 yards in East Allendale.

4. *F. rubra*, L. Native. British type. Area C, N, D. Range 1.

Common along the coast sand-hills, and occasionally in sandy ground inland, ascending in the Wear district to Bollihope Moor, 250 yards (J. Backhouse).

5. *F. sylvatica*, Vill. Native. Scottish type. Area D. Range 1.

In the Wear district in Bollihope Dene near Frosterley, 200–250 yards (J. Backhouse!).

6. *F. elatior*, Huds. Native. British type. Area C, N, D. Range 1, 2.

Stream-sides, frequent, ascending in Teesdale to Langdon Bridge, 400 yards, in East Allendale to 450 yards in the woods round Allenheads.

7. *F. pratensis*, Huds. Native. British type. Area C, N, D. Range 1, 2.

Common in grassy places, ascending to the Main Limestone scars of Kilhope, 550 yards, and to 500 yards in East Allendale. Var. *loliacea* is not unfrequent. Berwick, Lesbury, Netherton, Willington, Ravensworth, Lambton, Darlington, &c.

26. BROMUS, *L.*

1. *B. giganteus*, L. Native. British type. Area C, N, D. Range 1.

Frequent in damp woods and thickets, ascending in Weardale to Frosterley, 200 yards.

2. *B. asper*, L. Native. British type. Area C, N, D. Range 1, 2.

Frequent on hedge-banks and in thickets, ascending to 400 yards in Weardale, 1000 feet in Teesdale, 300 yards in Allendale.

3. *B. sterilis*, L. Native. British type. Area C, N, D. Range 1.

Common in the low country in dry waste ground and on hedge-banks, ascending in the Cheviot tract above Wooler, and in Coquetdale to Thropton, 150 yards.

4. *B. erectus*, Huds. Native. Xerophilous. Germanic type. Area D. Range 1.

On the Magnesian Limestone near Sedgefield (Rev. A. M. Norman !).

5. *B. secalinus*, L. Colonist. British type. Area C, N, D.

Cultivated fields, apparently rare. Spital, Reedsmouth, Gateshead, Norwood, Ravensworth, Sunderland, Sedgefield, Seaton Carew, Darlington.

6. *B. commutatus*, Schrad. Native. British type. Area C, N, D. Range 1.

Not unfrequent in cultivated fields, and occasionally in meadows, ascending in Coquetdale to Rothbury and 250 yards near Alwinton.

7. *B. mollis*, L. Native. British type. Area C, N, D. Range 1, 2.

Common in grassy places and cultivated fields, ascending to 600 yards in Kilhope, 550 yards in East Allendale.

27. BRACHYPODIUM, *Beauv.*

1. *B. sylvaticum*, R. and S. Native. British type. Area C, N, D. Range 1, 2.

Common in woods and on hedge-banks, ascending to 350 yards in Teesdale.

2. *B. pinnatum*, Beauv. Incognit.

Has been reported from High Force Wood, no doubt in mistake for either the preceding or the following, both of which grow there.

28. TRITICUM, *L.*

1. *T. caninum*, Huds. Native. British type. Area C, N, D. Range 1, 2.

Woods and hedge-banks, frequent, ascending to 400 yards in Weardale, 350 yards in Teesdale.

2. *T. repens*, L. Native. British type. Area C, N, D. Range 1, 2.

Hedge-banks and cultivated fields, common, ascending to 450 yards in East Allendale. Var. *littorale* is common amongst the coast sand-hills.

3. *T. acutum*, D. C. Native. Maritime. British type. Area C, N, D. Range 1.

Sand-hills along the coast. Fenham Flats, Hartley, St. Mary's Island, Seaton Carew, and about the mouths of the Wear and Tees.

4. *T. junceum*, L. Native. Maritime. British type. Area C, N, D. Range 1.

Frequent amongst the sand-hills all along the coast.

29. LOLIUM, *L.*

1. *L. perenne*, L. Native. British type. Area C, N, D. Range 1, 2.

Common along road-sides and in cultivated fields, ascending to 550 yards in West Allendale.

2. *L. italicum*, A. Br. Alien.

The species now commonly sown for forage instead of the preceding.

3. *L. temulentum*, L. Colonist. British type. Area C, N, D.

Cultivated fields, now rarely seen. Berwick, Belford, Newcastle, Whickham, Cleadon, Sunderland, Bishop Auckland, Castle Eden, Darlington.

30. ELYMUS, *L.*

1. *E. arenarius*, L. Native. Maritime. Scottish type. Area C, N, D. Range 1.

Not unfrequent along the coast on sand. Embleton, Newton-by-the-Sea, Newbiggen, Cullercoats, South Shields, Roker, Sunderland, Castle Eden, Seaton Carew.

31. HORDEUM, *L.*

1. *H. pratense*, Huds. Native. English type. Area C, N, D. Range 1.

Grassy places, rare, especially in Northumberland. Berwick, Ponteland, Willington, Jarrow, Monkton, Marsden, Hylton, Yarm, &c.

2. *H. sylvaticum*, Huds. Native. Xerophilous. British type. Area N, D. Range 1.

In the Wansbeck tract in Chapel Wood near Morpeth (M. J. F. Sidney!). In Tynedale in Ramshaw Wood and Scotswood Dene (F!). In Weardale on the banks of West Crow Burn near Stanhope, 200 yards (W. Backhouse. F.), and gathered by E. Robson between Ferryhill and Rushy Ford.

3. *H. murinum*, L. Native. English type. Area C, N, D. Range 1.

Frequent on sandy ground, especially along the coast. Roadside between Millfield and Yevering (Dr. Johnston).

4. *H. maritimum*, With. Native. Maritime. English type. Area D. Range 1.

Reported in Thompson's Berwick plants from Holy Island opposite St. Cuthbert's, but not seen lately. About Hartlepool and the Tees mouth, plentiful.

32. NARDUS, *L.*

1. *N. stricta*, L. Native. British type. Area C, N, D. Range 1–3.

Frequent on heaths, ascending to the peaks of all the hills, 850 yards on Cheviot.

33. LEPTURUS, *R. Br.*

1. *L. filiformis*, Trin. Native. Maritime. English type. Area C, N, D. Range 1.

Frequent along the coast line in salt-marshes.

II. FLOWERLESS PLANTS.

Order 1. FILICES.

1. CETERACH, *Willd.*

1. *C. officinarum*, Willd. Incognit.

A few plants noticed for three or four years by Dr. Tate on the walls of Hulne Abbey, but now extinct.

2. WOODSIA, *R. Br.*

1. *W. ilvensis*, R. Br. Native. Highland type. Area D. Range 1.

In Teesdale on Falcon Clints, 450–500 yards, now nearly or quite extinct.

3. POLYPODIUM, *L.*

1. *P. vulgare*, L. Native. British type. Area C, N, D. Range 1, 2.

Rocks, walls, and old trees, common, ascending to 500 yards.

2. *P. phegopteris*, L. Native. Scottish type. Area C, N, D. Range 1–3.

Frequent in the hill denes, ascending to 500 yards in Teesdale and the Derwent district, to 700 yards on Cheviot in the Dunsdale ravine, descending nearly to sea-level in Castle Eden Dene.

3. *P. dryopteris*, L. Native. Scottish type. Area C, N, D, Range 1, 2.

Often associated with the preceding, and even more frequent, ascending to 500 yards in the Cheviot ravines, 1430 feet near the head of the Knucton Burn, 1400 feet near Allenheads, descending to Castle Eden Dene, Hartlepool Bridge on the Blyth, Walbottle and Scotswood Denes on the Tyne.

4. *P. calcareum*, Sm. Native. English type. Xerophilous. Area D. Range 2.

Limestone cliffs on the banks of the stream that runs into the Tees at Middleton (T. Wilcke!). Altitude about 400 yards.

4. ALLOSORUS, *Bernh.*

1. *A. crispus*, Bernh. Native. Highland type. Area C, N, D. Range 1–3.

Plentiful in many places on the porphyritic crags of the Cheviot tract, ascending to the head of the ravines, 700 yards, descending to the junction of Caldgate and Common Burns, 200

yards. On the basaltic crags near Belford, 150 yards (T.)., Bavington, Gunnerton, Crag Lough, and Walltown, sparingly, and in South Tynedale on the banks of the Hartley Burn. In Teesdale and Weardale not unfrequent, ascending to 2000 feet on Stangend Rigg above Allenheads.

5. CYSTOPTERIS, *Bernh.*

1. *C. fragilis*, Bernh. Native. British type. Area C, N, D. Range 1, 2.

Frequent on walls and rocks amongst the hills, ascending to 600 yards in the Cheviot ravines and on the Main Limestone scars of Kilhope and Bleak Law, descending to Castle Eden Dene, Cawsey Dene, and Ravensworth Woods.

6. POLYSTICHUM, *Roth.*

1. *P. lonchitis*, Roth. Native. Highland type. Area C, D. Range 1, 2.

Near the railway between Alnwick and Morpeth, at an elevation of under 100 yards above sea-level. In Teesdale on Falcon Clints, 400–450 yards, now nearly or quite extinct.

2. *P. aculeatum*, Roth. Native. British type. Area C, N, D. Range 1, 2.

Woods and rocky places, frequent, ascending into the Cheviot ravines, and to 600 yards on the Main Limestone scars at Bleak Law.

3. *P. angulare*, Newm. Native. English type. Area C, D. Range 1.

Near Wooler in Humbleton Dene, Akeld Dene, and amongst the crags above the lower part of the Common Burn, 250 yards (James Hardy). Cauledge Woods near Alnwick (W. Richardson!). Castle Eden Dene (Mrs. Marley, *fide* Moore).

7. LASTREA, *Presl.*

1. *L. thelypteris*, Presl. Native. English type. Area C. Range 1.

Learmouth Bog near Cornhill (R. Embleton. T.).

2. *L. oreopteris*, Presl. Native. British type. Area C, N, D. Range 1, 2.

Frequent in woods and on shaded banks amongst the hills, ascending to 500 yards in the Cheviot ravines and East Allendale.

3. *L. filix-mas*, Presl. Native. British type. Area C, N, D. Range 1, 2.

Common in woods and upon hedge-banks, ascending to 600 yards on Cheviot and nearly as high in Harwood Dale. Var. *Borreri* on Falcon Clints, the banks of the College Burn, and in Hareshaw Dene. Var. *abbreviata* on Falcon Clints.

4. *L. spinulosa*, Presl. Native. English type. Area C, N, D. Range 1.

Damp and shaded woods, rare. Near Doddington and in Campfield Bog near Cornhill (W. Boyd). On the Brislee Hill, Hulne Park, 200 yards (W. Richardson!). In North Tynedale in a wood near Smalesmouth (W. H. Brown!). Waldridge Fell, Durham (J. Mitchinson, *fide* Moore).

5. *L. dilatata*, Presl. Native. British type. Area C, N, D. Range 1–3.

Common in woods and amongst rocks, ascending to 800 yards on Cheviot, 700 yards on Highfield, 650 yards on Stangend Rigg.

6. *L. æmula*, Brack. Native. Atlantic type. Area C. Range 1.

Chevington Wood near Warkworth (T.). Rugley Wood near Alnwick (R. Middlemas).

8. ATHYRIUM, *Roth.*

1. *A. filix-fœmina*, Roth. Native. British type. Area C, N, D. Range 1–3.

Woods and amongst rocks, common, ascending to 750 yards on Cheviot. Vars. *rhœticum* and *molle* are both frequent.

9. ASPLENIUM, *L.*

1. *A. viride*, Huds. Native. Highland type. Area C, N, D. Range 1, 2.

On Cheviot sparingly, on porphyritic crags in the Brizzle ravine. By the Irthing at Wardrew and Cromel Linn, and in South Tynedale in Whinetley Dene. In the Wear district in Harthope and Irishope. In Teesdale on Falcon Clints and the limestone scars of Harwood Dale. Range of altitude 150-550 yards.

2. *A. trichomanes*, L. Native. British type. Area C, N, D. Range 1, 2.

Walls and rocks, frequent, ascending to the Main Limestone scars of Bleak Law, 550 yards.

3. *A. marinum*, L. Native. Maritime. British type. Area C, N, D. Range 1.

Sparingly on rocks along the coast. Howick, Seaton Sluice, Marsden, Byer's Cave near Whitburn, Black Hall rocks near Hartlepool.

4. *A. adiantum-nigrum*, L. Native. British type. Area C, N, D. Range 1, 2.

Walls and rocks, frequent, ascending in Teesdale to the Main Limestone scars of Fendrith Hill, 500 yards.

5. *A. ruta-muraria*, L. Native. British type. Area C, N, D. Range 1, 2.

Walls and rocks, frequent, ascending in Teesdale to the Main Limestone scars of Newbiggen Moor, 550 yards. Very rare in Cheviot-land. On the limestone at Ratcheugh, and said to have been found also on Spindlestone crags (T.).

6. *A. germanicum*, Weiss. Native. Scottish type. Area C. Range 1.

Very sparingly amongst the basaltic debris at Kyloe, noticed for two seasons, one plant with nearly one hundred fronds, 150 yards (T.).

7. *A. septentrionale*, Hull. Native. Scottish type. Area C, Range 1.

On the basaltic crags at Kyloe, once plentiful, but now nearly extinct, 150 yards.

10. SCOLOPENDRIUM, *Sm.*

1. *S. vulgare*, Sym. Native. British type. Area C, N, D. Range 1.

Very rare in Cheviot-land. Houn Dene near Warkworth (T.). Frequent in shaded rocky places in Tyneland and Durham; Chapel Wood near Morpeth, and in many of the Tyne and Magnesian Limestone denes.

11. BLECHNUM, *Sw.*

1. *B. boreale*, Sw. Native. British type. Area C, N, D. Range 1–3.

Common on heaths, ascending to 850 yards on Cheviot.

12. PTERIS, *L.*

1. *P. aquilina*, L. Native. British type. Area C, N, D. Range 1, 2.

Common on heaths and in uncultivated grassy places everywhere except in the Magnesian Limestone tract, ascending to 600 yards on Cheviot and the moors at the head of East and West Allendale, and to 550 yards in Harwood Dale.

13. HYMENOPHYLLUM, *Sm.*

1. *H. tunbridgense*, Sm. Native. Atlantic type. Area C. Range 1.

On sandstone rocks on Harehope Moor near Eglingham (G. Tate!). Altitude 300 yards?

2. *H. Wilsoni*, Hook. Native. Atlantic type. Area C. Range 1.

On sandstone rocks on the Bickerton spur of Simonside (Sir W. C. Trevelyan. F. R!). Altitude 400 yards?

14. OSMUNDA, *L.*

1. *O. regalis*, L. Native. British type. Area C, N, D. Range 1.

Formerly in several stations, but now extirpated in most or all of them. Routing Linn near Doddington (J. Mitchell). Chevington Wood near Warkworth (T.). Rowlands Gill near Tanfield (W. H. Brown!). Crook Hall Wood near Durham (Mr. Bungey). Once seen in Teesdale near Winch Bridge, 300 yards (James Backhouse).

15. BOTRYCHIUM, *Sw.*

1. *B. lunaria*, Sw. Native. British type. Area C, N, D. Range 1, 2.

Frequent in grassy places, especially amongst the hills, ascending in the Cheviot tract to Langlee-ford Hope (James Hardy), to 400 yards in Langdon Dale, and rather higher in Rookhope.

16. OPHIOGLOSSUM, *L.*

1. *O. vulgatum*, L. Native. British type. Area C, N, D. Range 1.

Frequent in the meadows of the low country, but easily overlooked.

Order 2. MARSILEACEÆ.

1. ISOETES, *L.*

1. *I. lacustris*, L. Incognit.

Reported in the Flora from Crag Lough, probably by mistake for *Litorella*.

2. PILULARIA, *L.*

1. *P. globulifera*, L. Native. British type. Area N. Range 1.

Submersed in ponds, rare. Prestwick Carr (F. R!), and gathered by Messrs. Waugh and Thornhill in a pond by the side of the road half-a-mile north of Wolsington House near Ponteland.

Order 3. LYCOPODIACEÆ.

1. LYCOPODIUM, *L.*

1. *L. clavatum*, L. Native. British type. Area C, N, D. Range 1, 2.

Frequent on heaths, ascending to 500 yards on Cheviot.

2. *L. alpinum*, L. Native. Highland type. Area C, N, D. Range 1–3.

On the Teesdale, Weardale, and Cheviot Fells, ascending to 800 yards on Cheviot, descending to 300 yards on the moors near Crag Lough.

3. *L. selago*, L. Native. British type. Area C, N, D. Range 1–3.

Widely distributed amongst the moors, ascending to 850 yards on Cheviot, 700 yards on Highfield, descending to Prestwick Carr (100 feet above sea-level), and as low between Bilton and Warkworth.

4. *L. selaginoides*, L. Native. Highland type. Area C, N, D. Range 1, 2.

Stream-sides amongst the hills, not unfrequent. Cheviot, Alnwick Moor, Alnmouth, Newham, Bambro', Wallington Moors, Muckle Moss, Prestwick Carr, Coal Cleugh, 600 yards, Gateshead Fell, Collier Law, and frequent in the upper part of Weardale and Teesdale, ascending to 550 yards in Welhope.

Order 4. EQUISETACEÆ.

1. EQUISETUM, *L.*

1. *E. telmateia*, Ehrh. Native. English type. Area C, N, D. Range 1.

Frequent in swampy woods and by stream-sides.

2. *E. umbrosum*, Willd. Native. Scottish type. Area C, D. Range 1, 2.

By the side of the Coquet near Felton, within 100 feet of the sea-level, discovered by Mr. J. Sidebotham. In Teesdale about the lower part of the Langdon stream, and by the Tees down as far as Middleton Bridge, 250–400 yards.

3. *E. arvense*, L. Native. British type. Area C, N, D. Range 1–3.

Common on clayey banks and in cultivated fields, ascending to 550 yards in Allendale, 650 yards on Highfield near Grasshill.

4. *E. sylvaticum*, L. Native. British type. Area C, N, D. Range 1, 2.

Frequent in damp woods, ascending to 450 yards in the Cheviot ravines, 1600 feet in Harwood Dale, 550 yards in Allendale.

5. *E. palustre*, L. Native. British tpye. Area C, N, D. Range 1-3.

Frequent in damp places, ascending to 700 yards on Highfield, 600 yards at the head of Allendale.

6. *E. limosum*, L. Native. British type. Area C, N, D. Range 1, 2.

Common in ponds, ascending to Harbottle Lough, and to nearly 400 yards in Rookhope.

7. *E. hyemale*, L. Native. Scottish type, Area C, N, D. Range 1.

Stream-sides in the low country, rare. Banks of the Aln, Coquet, Wansbeck, in many of the Tyne denes, banks of the Derwent, Castle Eden Dene, &c.

8. *E. variegatum*, Schleich. Native. Scottish type. Area N, D. Range 1, 2.

By the Irthing at Wardrew, 150 yards (F. R!). In Teesdale from the banks of the Whey Sike down to the Tees as low as Middleton, 250–500 yards.

ADDENDA.

Whilst the Flora has been passing through the press two new species have been discovered, viz. :—

Rosa systyla, Woods.

Gathered by Mr. Wm. Richardson in the neighbourhood of Alnwick; not known with certainty before in England northward of Worcestershire.

Carex incurva, Lightf.

Gathered on the sandy links of Holy Island by the Berwickshire Club on the 29th of August, 1867; not known before with certainty southward of Kincardine.

The following new stations for plants already included in our list deserve to be mentioned, viz. :—

Bidens cernua.

Barlees Bog near Cornhill. Dr. Tate.

Narcissus pseudo-narcissus.

We are indebted to Mr. Embleton for a specimen of the true plant from a field on the bank of the Coquet between Warkworth and Acklington.

LIST OF BALLAST PLANTS.

The following is a list of the more remarkable stranger-plants which from time to time have been gathered on the ballast-hills of the two counties. Their localities are indicated by letters placed in three columns, T. meaning the heaps on the banks of the Tyne, S. those in the neighbourhood of Sunderland, and H. those in the neighbourhood of Hartlepool and the Tees mouth. The list is compiled from Winch's Flora and papers by the Rev. A. M. Norman and Mr. M. A. Lawson in the 5th vol. of our Transactions, with a few additions from other sources. In the countries mentioned in the second column the species are either natives or well-established weeds. Those for which no letters are given are mentioned in Winch's list without any particular locality. We believe that it rarely happens that any of these ballast introductions ripen seed, and spring up a second time, so that when fresh importations cease they disappear speedily. Although we see that this ballast-list includes more than a hundred and fifty species, of the plants mentioned in the body of the work *Reseda lutea*, *Sinapis tenuifolia*, *Pastinaca sativa*, and perhaps three or four of the *Chenopodiaceæ* are all that are at all likely to have been introduced in this way. As Mr. Lawson has explained in his paper, for the first year or two after the ballast has been laid down the annuals spring up; then these disappear and the perennials succeed them; and, finally, in the struggle for existence, if the heaps become disused, these are crowded out by thistles and wormwood, milfoil and ragwort, *Triticum*, and *Ammophila*, and *Festuca rubra*.

Clematis vitalba, *L.*	S. England	T.	...	H.
Ranunculus hirsutus, *Curt.*	England	T.	S.	
muricatus, *L.*	S. Europe			
Delphinium Ajacis, *L.*	S. Europe	T.	S.	
Nigella arvensis, *L.*	S. Europe			
damascena, *L.*	S. Europe			
Papaver hybridum, *L.*	England	...	...	H.
Argemone mexicana, *L.*	Mexico			

Glaucium luteum, *L.*	Britain	T.	S.	H.
Fumaria micrantha, *Lag.*	Britain	...	...	H.
Vaillantii, *Lam.*	Britain	...	...	H.
Coronopus didyma, *Sm.*	England	T.	S.	H.
Lepidium draba, *L.*	England	...	...	H.
hirtum, *L.*	S. Europe	...	S.	
sativum, *L.*	E. Europe	T.	S.	H.
ruderale, *L.*	England	T.	...	H.
Camelina sativa *Crantz.*	England	T.	S.	H.
Farsetia incana, *R. Br.*	Central Europe	...	...	H.
Nasturtium amphibium, *R. Br.*	England	...	S.	H.
Sisymbrum irio, *L.*	England	...	...	H.
austriacum, *Jacq.*	Central Europe	...	...	H.
Erysimum cheiranthoides, *L.*	England	T.	S.	H.
orientale, *L.*	S. Europe	T.	S.	
Brassica oleracea, *L.*	S. England	T.	S.	H.
Sinapis tenuifolia, *R. Br.*	England	T.	S.	H.
muralis, *R. Br.*	England	T.	S.	H.
cheiranthus, *Koch.*	England	...	...	H.
monensis, *L.*	England	...	...	H.
Raphanus maritimus, *Sm.*	England	...	...	H.
Rapistrum rugosum, *All.*	S. Europe	...	...	H.
Reseda odorata, *L.*	S. Europe	T.	S.	H.
fruticulosa, *L.*	S. Europe	T.	...	H.
Frankenia lævis, *L.*	S. England	...	S.	
Dianthus armeria, *L.*	England	...	S.	
Silene conica, *L.*	England	T.		
anglica, *L.*	England	T.	S.	
otites, *L.*	England	...	...	H.
Cerastium aquaticum, *L.*	England	...	S.	
Linum perenne, *L.*	England	...	...	H.
angustifolium, *Huds.*	England	...	...	H.
Lavatera arborea, *L.*	England	T.		
trimestris, *L.*	S. Europe			
Erodium maritimum, *Sm.*	England	...	S.	
moschatum, *L. Herit.*	England	...	...	H.
Geranium pyrenaicum, *L.*	England	T.		
rotundifolium, *L.*	England	T.	S.	
Medicago sativa, *L.*	England	T.	S.	H.
falcata, *L.*	England	T.	S.	H.
maculata, *Willd.*	England	T.	S.	
minima, *Lam.*	England	...	...	H.
denticulata, *Willd.*	England	...	...	H.
prostrata, *Jacq.*	S. Europe			
coronata, *Lam.*	S. Europe			
rigidula, *Willd.*	S. Europe			
Melilotus vulgaris, *Willd.*	England	T.	S.	H.
arvensis, *Wallr.*	England	T.		
messanensis, *Desf.*	S. Europe			
Trifolium subterraneum, *L.*	England	...	S.	
ochroleucum, *L.*	England	...	S.	
maritimum, *Huds.*	England	T.	S.	
glomeratum, *L.*	England	...	S.	
Scorpiurus vermiculata, *L.*	S. Europe			
Ornithopus perpusillus, *L.*	England	...	S.	
compressus, *L.*	S. Europe			
Onobrychis sativa, *Lam.*	England	T.	...	H.

Vicia bithynica, *L.*	England	...	S.	
benghalensis, *L.*	E. Indies			
Lathyrus aphaca, *L.*	England	T.	S.	
sylvestris, *L.*	England	...	...	H.
nissolia, *L.*	England	T.		
hirsutus, *L.*	England	...	S.	
ochrus, *L.*	S. Europe.			
Rosa Borreri, *Woods*	England	T.		
Œnothera biennis, *L.*	N. America	T.	...	H.
Claytonia perfoliata, *L.*	N. America	T.		
Herniaria hirsuta, *L.*	S. Europe	...	...	H.
Mesembryanthemum crystallinum, *L.*	Grecce			
falcatum, *L.*	Cape of Good Hope			
glomeratum, *L.*	Cape of Good Hope			
Eryngium campestre, *L.*	S. Europe	T.	S.	H.
Petroselinum sativum, *Hoffm.*	S. Europe	T.	S.	
Sison amomum, *L.*	England	...	S.	
Fœniculum vulgare, *Gaertn.*	England	T.	S.	H.
Pastinaca sativa, *L.*	England	T.	S.	H.
Tordylium syriacum, *Willd.*	W. Asia			
Cuminum cyminum, *L.*	Egypt			
Dipsacus fullonum, *L.*	Cultivated		S.	
pilosus, *L.*	England		S.	
Picris hieracioides, *L.*	England	T.	S.	
Barkhausia taraxacifolia, *D. C.*	England	T.	S.	
Carduus eriophorus, *L.*	England	...	...	H.
setosus, *Bab.*	E. Europe	...	...	H.
Galactites tomentosa, *Moench.*	S. Europe			
Calendula arvensis, *L.*	S. Europe	...	S.	
officinalis, *L.*	S. Europe			
Centaurea jacea, *L.*	S. Europe	T.	...	H.
calcitrapa, *L.*	England	T.	...	H.
solstitialis, *L.*	England	...	...	H.
orientalis, *L.*	E. Europe.	...	...	H.
Artemisia campestris. *L.*	Europe	...	...	H.
Erigeron canadensis, *L.*	S. England	...	S.	H.
Inula conyza, *D. C.*	England	T.	...	H.
Anthemis tinctoria, *L.*	S. Europe	T.	S.	H.
tomentosa, *L.*	S. Europe			
valentina, *L.*	S. Europe			
mixta, *L.*	S. Europe			
Xanthium strumarium, *L.*	England	T.	S.	
Specularia hybrida, *A. D. C.*	England	...	S.	
Convolvulus tricolor, *L.*	S. Europe			
Hyoscyamus albus, *L.*	S. Europe	...	S.	
aureus, *L.*	Levant			
Solanum nigrum, *L.*	England	T.	S.	H.
Verbascum nigrum, *L.*	England	T.	S.	
blattaria, *L.*	England	...	...	H.
Antirrhinum orontium, *L.*	England	T.	S.	
Linaria spuria, *Mill.*	England	T.	S.	H.
elatine, *Mill.*	England	T.	S.	H.
repens, *Ait.*	England	T.		
minor, *Desf.*	England	...	...	H.
Calamintha nepeta, *Clairv.*	England	T.		
Borago officinalis, *L.*	England	T.	S.	H.
Anchusa officinalis, *L.*	S. Europe	T.		

Echium italicum, *L.*	S. Europe	...	S.	
Chenopodium olidum, *Curt.*	England	T.		
polyspermum, *L.*	England	...	S.	
urbicum, *L.*	England	T.	S.	
murale, *L.*	England	...	...	H.
hybridum, *L.*	England	T.	S.	
ficifolium, *Sm.*	England	T.	S.	
glaucum, *L.*	England	T.	S.	H.
Amaranthus blitum, *L.*	England	T.	S.	
Blitum virgatum, *L.*	S. Europe	...	...	H.
Atriplex pedunculata, *L.*	England	...	S.	
hortensis, *L.*	Asia			
Schoberia fruticosa, *Mey.*	England	T.		
Polygonum fagopyrum, *L.*	Cultivated	T.	S.	
Rumex maritimus, *L.*	England	T.	S.	H.
palustris, *Sm.*	England	T.	S.	
Euphorbia amygdaloides, *L.*	England	...	...	H.
spinosa, *L.*	S. Europe			
Pedilanthus tithymaloides, *Poir.*	S. America			
Mercurialis annua, *L.*	England	...	...	H.
Urtica pilulifera, *L.*	England	T.	S.	
Cannabis sativa, *L.*	Asia			
Digitaria sanguinalis, *Scop.*	S. Europe	...	S.	
Setaria verticillata, *Beauv.*	England	...	S.	
viridis, *Beauv.*	England	T.	S.	
Polypogon monspeliensis, *Desf.*	England	...	S.	
Phalaris canariensis, *L.*	England	T.	S.	H.
paradoxa, *L.*	S. Europe			
Cynosurus echinatus, *L.*	S. Europe	T.	S.	
Bromus arvensis, *M. and K.*	England	T.	...	H.
madritensis, *L.*	England	...	S.	
maximus, *Desf*	England	...	S.	

SUMMARY.

1.—Adapting the Northumberland and Durham list to the standard as regards specific limits of Watson's *Cybele Britannica* we claim for the two counties taken together nine hundred and thirty-five species out of the one thousand four hundred and twenty-five which are yielded by the whole of Britain, exclusive of Ireland, and besides these we have enumerated two hundred and four casual introductions, eighty-seven of which are stray garden plants, or occasional corn-field weeds, the other one hundred and seventeen plants introduced with ballast.

2.—Out of these nine hundred and thirty-five species which we consider we may fairly claim for the two counties, at least eighty-nine seem more likely to have been introduced by human

agency than to be genuine aborigines, but it is of course impossible to draw the line between the two classes with any precision. In this eighty-nine we include sixty-three well-established weeds of cultivated ground, and twenty-six which are either trees or plants likely to have been introduced through garden cultivation.

3.—Classing the plants of the two counties according to the types of distribution of the *Cybele Britannica*, we obtain the following result:—

	Whole of Britain.	Northumberland and Durham.
British type	532	532
English ,,	409	251
Germanic ,,	127	26
Atlantic ,,	70	5
Highland ,,	120	36
Scottish ,,	81	57
Intermediate ,,	37	21
Local	49	7
Total	1425	935

4.—If we arrange the plants of Britain on the basis of this last table in three principal geographical classes, according as they are distributed over its whole extent, or shew a northern or southern tendency, we shall of course find the characteristic peculiarities of the botany of the different parts of the island as compared with one another, in the absence or presence of the plants of the two last classes. The characteristic of the North of England is that it yields a fair proportion of both of them. In Northumberland and Durham we have one hundred and fourteen out of the two hundred and thirty-eight northern and montane plants, and two hundred and eighty-two out of the six hundred and six comparatively southern species. Of the eighteen botanical provinces defined in the *Cybele* the richest in number of species are those of the south-east of England. The Thames province, which includes Kent, Surrey, Berks, Oxford, Bucks, Middlesex, Herts, and Essex, an area of 7000 square miles, yields one thousand and fifty-one species. The Channel province, which

includes Dorset, Wilts, Hants, and Sussex, 5464 square miles, yields one thousand and forty species. Next to these comes the Humber province, which is conterminous with Yorkshire, has an area of 5836 square miles, and yields one thousand and fifteen species. This number is higher than that of the Midland provinces, because, although in the latter the number of southern species is greater than in Yorkshire, the number of northern ones is very much fewer. As compared with Yorkshire, the Tyne province has only about half its area and eighty fewer plants. In northern species they are nearly upon an equality, the difference between the two being almost altogether caused by the absence beyond the Tees of southern plants which run out in Yorkshire. For the northern half of Wales we know nine hundred and thirty-eight species, for the Mersey province, which includes Cheshire and Lancashire, eight hundred and forty-two, for the two Lake counties and Isle of Man eight hundred and sixty, but for none of these three have Floras been written, and we cannot consider their lists complete, whilst for our own province we cannot expect any material increase.

5.—We have seen in Yorkshire how rapidly the southern types thin out. Through our two counties this continues in a marked manner, and the following seventy-seven species which we have admitted fail to reach Scotland.

Twenty-eight reach Cheviot-land, viz:—

Humulus lupulus.
Allium schænoprasum.
Glyceria procumbens.
Arundo calamagrostis.
Convallaria polygonatum.
Mænchia erecta.
Euphorbia amygdaloides.
Populus alba.
Ulmus campestris.
Juncus diffusus.
Ribes grossularia.
nigrum.
Verbena officinalis.
Agrimonia odorata.
Orchis morio.
Atropa belladonna.
Helminthia echioides.
Solanum nigrum.
Chenopodium urbicum.
Galium tricorne.
Hippohae rhamnoides.
Lepidium latifolium.
Rubus discolor.
diversifolius.
Rosa rubiginosa.
Orobanche minor.
Rosa systyla.
Narcissus pseudo-narcissus.

Eighteen stop short in Tyneland, viz. :—

Myosurus minimus.
Medicago maculata.
Myriophyllum verticillatum.
Bryonia dioica.
Apera spica-venti.
Hordeum sylvaticum.
Chenopodium glaucum.
murale.
Scrophularia aquatica.
Convallaria multiflora.
Taxus baccata.
Helleborus viridis.
Lactuca muralis.
Rubus leucostachys.
Orchis ustulata.
Tamus communis.
Helleborus fœtidus.
Cuscuta trifolii.

Thirty-one stop short in Durham, viz. :—

Picris hieracioides.
Daphne mezereum.
Inula helenium.
Cornus sanguinea.
Acer campestre.
Lysimachia nummularia.
Viola odorata.
Hypericum montanum.
Mentha pulegium.
Rhamnus catharticus.
Polypodium calcareum.
Ophrys muscifera.
Colchicum autumnale.
Hottonia palustris.
Linum perenne.
Galeopsis ochroleuca.
Ligustrum vulgare.
Carduus eriophorus.
Onobrychis sativa.
Hordeum maritimum.
Iris fœtidissima.
Butomus umbellatus.
Hydrocharis morsus-ranæ.
Bupleurum tenuissimum.
Ophrys apifera.
Ranunculus parviflorus.
Papaver hybridum.
Bupleurum rotundifolium.
Caucalis daucoides.
Cypripedium calceolus.
Specularia hybrida.

6.—Only one species is restricted in Britain to our two counties, the Teesdale *Arenaria uliginosa*, and that has a wide distribution on the Continent, reaching from Lapland to Lombardy and Austria. A second Teesdale species, only discovered, or rather determined, very recently, *Viola arenaria*, has still more recently been found over the Westmorland border; and sixteen of the northern species are not found further south on the east side of the island, viz. :—

Juncus triglumis.
Epilobium anagallidifolium.
Woodsia ilvensis.
Linnæa borealis.
Hieracium lasiophyllum.
Convallaria verticillata.

Vaccinium uliginosum.
Asplenium germanicum.
Carex irrigua.
Hieracium argenteum.
Callitriche autumnalis.
Ligusticum scoticum.
Lamium intermedium.
Blysmus rufus.
Mertensia maritima.
Carex incurva.

7.—Dividing the surface of the two counties into three zones of altitude and climate, as explained already, only thirteen species out of the nine hundred and thirty-five do not grow somewhere in the lower one, whilst four hundred and eighteen species ascend into the middle zone and only one hundred and eight into the highest of the three. Fifty species are essentially restricted to the sea-coast, and forty-five shew a decided preference for the dry-soiled and especially the limestone tracts.

CORRECTIONS AND NOTES TO CHAPTER I.

(GEOLOGY).

Page	6	line	22,	for	Spirorbis	read	Spirorbes.
,,	10	,,	8,	,,	iridoines	,,	iridinoides.
,,	14	,,	1,	,,	underlies	,,	overlies.
In the Map (Index of Colours).....				,,	Tziassica	,,	Triassica.

This geological chapter having been written for a special object, and subordinate to an account of the botany, and chiefly moreover giving generalized results of my own researches, it seemed unnecessary to enter into the bibliography of our local geology. In passing I have mentioned the names of those who have contributed special information; and I hope hereafter, in a more extended memoir on the geology of Northumberland and the Borders, to go more fully into the subject. A few other references may be given here.

The genera recently added to the Ichthyology of the Coal Measures by Professor Owen, and referred to in page 16, have been described and illustrated by him in the "Transactions of the Odontological Society" for 1867. Mr. Atthey, however, in a paper recently read before the Tyneside Club, disputes the validity of most of these new genera; and his paper will, I understand, be printed in our "Transactions." Messrs. Hancock & Atthey have also, in the "Annals and Magazine of Natural History" for February, 1868, described six new species of *Ctenodus*, obtained from the shales connected with the Low Main Seam of Coal. This was also read at a meeting of the Club, and will be printed in the "Transactions."

Little has been added to the Flora of the Newcastle Coal Measures since the time of Lindley and Hutton, whose "Fossil Flora," published from 1831 to 1837, furnishes descriptions of most of the known species. Witham, in his observations on Fossil Vegetables in 1831, and in his "Vegetable Fossils of Lennel Braes," explained the internal structures of some fossil plants,

and described a few species of *Coniferæ*; and Professor King, in 1844, published an elaborate paper on the characters of *Sigillaria*. The species in the Newcastle Coal Measures have been carefully tabulated, with references, by Professor Morris in his "Catalogue of British Fossils" in 1854; and also by Mr. Howse in his "Synopsis of Organic Remains," in 1865. Some account of the Mountain Limestone Flora was given by myself in 1853, in Dr. Johnston's "Botany of the Eastern Borders."

Of the few fossil remains of Mammalia which have been observed in superficial deposits, Mr. Howse has given an account in the "Transactions of the Tyneside Naturalists' Field Club," Vol. IV., page 111. Probably remains of the beaver may be discovered lurking in some of our bogs, as they have been found in the adjoining county of Roxburghshire.

INDEX OF GENERA.

Acer, 143.
Achillea, 205.
Aconitum, 119.
Adonis, 114.
Adoxa, 174.
Ægopodium, 177.
Æthusa, 179.
Agrimonia, 156.
Agrostis, 282.
Aira, 283.
Ajuga, 224.
Alchemilla, 164.
Alisma, 263.
Allium, 258.
Allosorus, 294.
Alnus, 247.
Alopecurus, 281.
Alyssum, 126.
Ammophila, 282.
Anacharis, 262.
Anagallis, 234.
Anchusa, 230.
Andromeda, 207.
Anemone, 114.
Angelica, 180.
Anthemis, 205.
Anthoxanthum, 281.
Anthriscus, 182.
Anthyllis, 148.
Antirrhinum, 218.
Apargia, 188.
Apera, 282.
Apium, 176.
Aquilegia, 118.
Arabis, 127.
Arbutus, 208.
Arctium, 195.
Arenaria, 138.
Armeria, 235.
Armoracia, 125.
Arrhenatherum, 285.
Artemisia, 199.
Arum, 267.
Arundo, 283.
Asperugo, 231.
Asperula, 186.
Asplenium, 297.
Aster, 201.
Astragalus, 151.
Athyrium, 296.
Atriplex, 238.
Atropa, 214.
Avena, 284.

Ballota, 224.
Barbarea, 127.
Barkhausia, 194.
Bartsia, 216.
Bellis, 203.
Berberis, 119.
Beta, 239.
Betula, 247.
Bidens, 199.
Blechnum. 298.
Blysmus, 272.
Borago, 230.
Botrychium, 299.
Brachypodium, 291.
Brassica, 129.
Briza, 288.
Bromus, 290.
Bryonia, 169.
Bunium, 177.
Bupleurum, 178.
Butomus, 263.

Cakile; 122.
Calamintha, 223.
Callitriche, 168.
Calluna, 207.
Caltha, 117.
Camelina, 126.
Campanula, 205.
Capsella, 123.
Cardamine, 126.
Carduus, 195.
Carex, 275.
Carlina, 198.
Carpinus, 246.
Carum, 177.
Castanea, 246.
Catabrosa, 286.
Caucalis, 181.
Centaurea, 198.
Centranthus, 186.
Cephalanthera, 253.
Cerastium, 139.
Ceratophyllum, 168.
Ceterach, 293.
Chærophyllum, 182.
Cheiranthus, 129.
Chelidonium, 121.
Chenopodium, 237.
Chlora, 211.
Chrysanthemum, 204.

Chrysosplenium, 173.
Cichorium, 195.
Cicuta, 176.
Circæa, 167.
Cladium, 271.
Cochlearia, 125.
Colchicum, 262.
Comarum, 157.
Conium, 175.
Convallaria, 260.
Convolvulus, 212.
Cornus, 174.
Coronopus, 122.
Corydalis, 121.
Corylus, 246.
Cratœgus, 165.
Crepis, 190.
Crocus, 257.
Cuscuta, 213.
Cynoglossum, 231.
Cynosurus, 288.
Cypripedium, 256.
Cystopteris, 295.

Dactylis, 289.
Daphne, 243.
Datura, 213.
Daucus, 181.
Delphinium, 118.
Dianthus, 134.
Digitalis, 218.
Dipsacus, 187.
Doronicum, 203.
Draba, 125.
Drosera, 133.

Echium, 231.
Elymus, 292.
Elyna, 275.
Empetrum, 244.
Epilobium, 165.
Epipactis, 253.
Equisetum, 300.
Erica, 207.
Erigeron, 201.
Eriophorum, 274.
Erodium, 143.
Eryngium, 175.
Erysimum, 129.
Erythræa, 211.
Euonymus, 146.
Eupatorium, 199.
Euphorbia, 244.
Euphrasia, 216.

Fagus, 246.
Fedia, 187.
Festuca, 289.
Filago, 200.
Fragaria, 157.
Fraxinus, 210.
Fumaria, 121.

Gagea, 259.
Galanthus, 258.
Galeopsis, 225.
Galium, 184.
Genista, 147.
Gentiana, 211.
Geranium, 144.
Geum, 155.
Glaucium, 121.
Glaux, 235.
Glechoma, 227.
Glyceria, 286.
Gnaphalium, 200.
Gymnadenia, 255.

Habenaria, 255.
Hedera, 174.
Helianthemum, 131.
Helleborus, 118.
Helminthia, 188.
Helosciadium, 176.
Heracleum, 180.
Hesperis, 129.
Hieracium, 191.
Hippohae, 243.
Hippuris, 167.
Holcus, 285.
Honckeneja, 137.
Hordeum, 292.
Hottonia, 233.
Humulus, 246.
Hyacinthus, 260.
Hydrocharis, 262.
Hydrocotyle, 175.
Hymenophyllum, 298.
Hyoscyamus, 213.
Hypericum, 141.
Hypochæris, 189.

Iberis, 124.
Ilex, 210.
Impatiens, 145.
Inula, 203.
Iris, 257.
Isatis, 122.
Isoetes, 299.

Jasione, 206.
Juncus, 268.
Juniperus, 252.

Knautia, 188.
Kœleria, 285.

Lactuca, 189.
Lamium, 224.
Lapsana, 194.
Lastrea, 295.
Lathræa, 220.
Lathyrus, 154.
Lemna, 267.
Leonurus, 225.
Lepidium, 124.
Lepturus, 293.
Leucojum, 258.
Ligusticum, 179.

Ligustrum, 210.
Lilium, 259.
Limosella, 219.
Linaria, 219.
Linnæa, 184.
Linum, 140.
Listera, 252.
Lithospermum, 229.
Littorella, 237.
Lolium, 292.
Lonicera, 184.
Lotus, 151.
Luzula, 270.
Lychnis, 135.
Lycopodium, 300.
Lycopsis, 230.
Lycopus, 221.
Lysimachia, 234.
Lythrum, 169.

Malaxis, 256.
Malva, 141.
Marrubium, 227.
Matricaria, 204.
Medicago, 148.
Melampyrum, 217.
Melica, 285.
Melilotus, 149.
Mentha, 221.
Menyanthes, 212.
Mercurialis, 245.
Mertensia, 229.
Meum, 180.
Milium, 282.
Mimulus, 219.
Moenchia, 135.
Molinia, 286.
Monotropa, 210.
Montia, 169.
Myosotis, 228.
Myosurus, 114.
Myrica, 251.
Myriophyllum, 168.
Myrrhis, 182.

Narcissus, 257.
Nardus, 293.
Narthecium, 271.
Nasturtium, 128.
Neottia, 252.
Nepeta, 227.
Nuphar, 119.
Nymphæa, 119.

Œnanthe, 178
Onobrychis, 152.
Ononis, 148.
Onopordum, 197.
Ophioglossum, 299.
Ophrys, 256.
Orchis, 253.
Origanum, 223.
Ornithogalum, 260.
Ornithopus, 152.
Orobanche, 220.
Orobus, 154.
Osmunda, 299.
Oxalis, 146.

Papaver, 120.
Parietaria, 245.
Paris, 261.
Parnassia, 174.
Pastinaca, 180.
Pedicularis, 217.
Peplis, 169.
Petasites, 201.
Petroselinum, 176.
Peucedanum, 180.
Phalaris, 280.
Phleum, 281.
Picris, 188.
Pilularia, 299.
Pimpinella, 178.
Pinguicula, 231.
Pinus, 251.
Plantago, 236.
Poa, 287.
Polemonium, 212.
Polygala, 133.
Polygonum, 240.
Polypodium, 294.
Polystichum, 295.
Populus, 247.
Potamogeton, 264.
Potentilla, 156.
Poterium, 164.
Primula, 232.
Prunella, 228.
Prunus, 154.
Pteris, 298.
Pulicaria, 203.
Pulmonaria, 231.
Pyrethrum, 204.
Pyrola, 209.
Pyrus, 165.

Quercus, 246.

Ranunculus, 114.
Raphanus, 130.
Reseda, 131.
Rhamnus, 146.
Rhinanthus, 217.
Rhynchospora, 272.
Ribes, 170.
Rosa, 161.
Rubus, 158.
Rumex, 241.
Ruppia, 266.
Ruscus, 260.

Sagina, 136.
Sagittaria, 263.
Salicornia, 239.
Salix, 248.
Salsola, 239.
Salvia, 221.
Sambucus, 183.

Samolus, 235.
Sanguisorba, 164.
Sanicula, 175.
Saponaria, 134.
Saxifraga, 172.
Scabiosa, 187.
Scandix, 181.
Schœnus, 271.
Schoberia, 239.
Scilla, 260.
Scirpus, 272.
Scleranthus, 170.
Scolopendrium, 298.
Scrophularia, 218.
Scutellaria, 228.
Sedum, 171.
Sempervivum, 172
Senecio, 202.
Serratula, 195.
Sesleria, 283.
Sherardia, 186.
Silaus, 179.
Silene, 134.
Sinapis, 130.
Sison, 177.
Sisymbrium, 128.
Sium, 177.
Smyrnium, 176.
Solanum, 213.
Solidago, 201.
Sonchus, 190.
Sparganium, 267.
Spartium, 147.
Specularia, 206.
Spergula, 137.
Spergularia, 137.
Spiræa, 155.
Stachys, 226.
Staphylea, 146.
Statice, 235.
Stellaria, 138.
Stratiotes, 262.
Symphytum, 230.

Tamus, 261.
Tanacetum, 199.
Taraxacum, 194.
Taxus, 251.
Teesdalia, 123.
Teucrium, 224.
Thalictrum, 113.
Thlaspi, 123.
Thrincia, 188.
Thymus, 222.
Tilia, 141.
Tofieldia, 262.
Torilis, 181.
Tragopogon, 188.
Trientalis, 233.
Trifolium, 149.
Triglochin, 263.
Triodia, 285.
Triticum, 291.
Trollius, 117.
Tulipa, 258.
Turritis, 127.
Tussilago, 201.
Typha, 268.

Ulex, 147.
Ulmus, 246.
Urtica, 245.
Utricularia, 232.

Vaccinium. 208.
Valeriana, 186.
Verbascum, 214.
Verbena, 220.
Veronica, 214.
Viburnum, 183.
Vicia, 152.
Villarsia, 212.
Vinca, 210.
Viola, 131.

Woodsia, 294.

Zannichellia, 266.
Zostera, 266.

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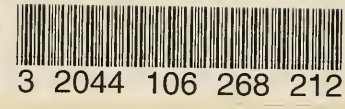
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